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Pilots vs. the Sandbags, or—

by
T-2003

A Salmson Observation plane in flight, 1st Aero Squadron, U. S. Army Air Corps. Photo by 16th Photo Section. Powered with a Canton-Unne' Radial engine.

WHO won the War? I'll bite, who did? Get around a gang of old timers who had served in the single-seaters and you come away knowing full well that it was these pursuiters who brought the war to a close as soon as it did.

You doubt one of them, on some extravagant point, and they shake "the records" in your face, the records of Rickenbacker of the 94th Pursuit Squadron with 25 aerial victories to his credit, Luke, the Balloon-Buster of the 27th with 18 victories, Vaughn of the 17th Pursuit with 13 victories,—all pursuiters these fellows, as well as most of the others who follow them in the brave galaxy of aces.

"As well as *most* of the others," eh? Then *some* of the aces were not pursuiters but from observation or bombardment outfits, you reason, and so it proves, for there even on the first page of the War Department records stands the name of Bill Erwin with 8 victories, —Lieut. William P. Erwin of the 1st Squadron, a Corps Observation outfit.

More lads from the two-place outfits follow, both among the bona fide aces or from the others with less than the required five victories. Your respect for the heroes of the DeH, (which is no more in Army aviation) or the Breguet or Salmson, increases.

In the end, it was the pursuiter's job to go out looking for an adversary and fight him down out of the sky. The bomber's job was to bomb certain objectives and the reconnaissance teams were sent out to bring back the dope. If they did, then so much to their credit.

Yet sometimes, in the process of their daily work, these two-seaters were pounced on by the enemy and fighting back in defense proved mighty offensive to the Boche. Your eye travels down the list, published by the Army Air Corps. Their names appear, thick and fast, even among the aces,—Art Easterbrook of the 1st, Len Hammond of the 91st, and Bill Badham, Everett Cook and Vic Strahm also of that outfit.

Wait a minute, Easterbrook wasn't a *pilot*, he wasn't even commissioned in the Air Service. He was an Infantry Lieutenant detailed as an observer with the 1st Squadron because of his knowledge of ground tactics. (Later he was commissioned in the regular Army Air Service, after having been rated an airplane pilot after demonstrating his ability as such to his squadron mates). But all through the war, Art wore the *half* wings insignia on his breast, this signifying the Knight of the Rear Seat.

And how about Tom Jervey? Lieutenant Thomas M. Jervey, of the Air Service, you mean? Air Service, my eye; he was an officer of the Ordnance Department, and armament officer with the 91st Squadron. No pilot he, in fact he shouldn't even have been up in the air, but a guy's gotta see how the guns really work in the air, doesn't he? Sure he does, so out goes Tom and three enemy pilots fly in front of his gunsights and he pulls the trigger. Like that. The guns must have worked o. k. Look it up in the book,—3 aerial victories.

Say, when the writin' fellers talk about brave peelots, how about a word or two for the lads in the rear seat, thinks I. And then into the office pops an old friend, ear flaps of his helmet tucked back, and goggles with use-blackened rubber flanges pushed back on his head.

"Pretty soft," he remarked. He had just wobbled his ship through some gooey weather over the Alleghanies (you know what that means?) and here I was sitting down getting all excited over something that happened 14 or 15 years ago.

"Say, Ray, I've been thinking aloud on the Underwood. A word or two from you about the observers in the World War. You were a pilot in a two-seater outfit, no?"

"Yes, the 166th Day Bombardment Squadron."

"Well, how about some dope on the observers you had?"

"Straight?" "Some dope?"

"Uh-huh," said I, eagerly.

"Well, then I got one *swell* dope to talk about. Hey, that was his name, too, I mean his nickname, 'the Dope.'"

And here's Ray's story:

"I'm not the pilot who says that his is the only important job in an observation or bombing plane over the enemy lines. I've had enough such time over

Here comes the same Salmson plane as above, nose on and showing the gun elevation over the top wing. Photo by the 16th Photo Section.

It Takes Two to Tell a Story

the lines during the War and enough pilot *and* observer time since then in Army planes to convince me that teamwork is the thing that counts.

"Just the same, there's dumb eggs in all categories and we pilots used to have a name for really dumb observers or bombers. Sandbags we called 'em, among other things not so mild. What, in turn, these sandbags called us I don't know, nor do I care. I want to tell you about one of them that *I* had, like you asked.

" 'The Dope,' to give him a name that was not actually his, but fitted, was just a kid. He must have lied nobly about his age to get sworn in. Having heard that the ideal flyer was a kid of 18 who had been crossed in love, I was all keen to pick a young and irresponsible one, when a bunch of bombardiers were sent to our squadron. And I did, I picked 'The Dope.' Vic Parks, our C. O., approved the team-up, so I took the youngster under my wing. (Vic, by the way, is now a Major in the Chemical Warfare Service of the Regular Army).

"Came the dawn, as they say, the early murky dawn. 'The Dope' climbed into the DeHaviland and I followed suit. We were part of a seven-ship formation led by the Skipper and Buzancy was the objective. The sun peeked over the horizon as we crossed the lines, right on schedule, and two minutes later thirty Fokkers and Pfalz jumped us, also on schedule. We closed in together and let the rear-seat men fight back, all for one and one for all. My breast heaved with the heroic thoughts of the occasion, but I kept in formation.

"Suddenly my engine sputtered and the otherwise faithful Liberty died altogether, just as we reached the objective. I nosed down at the first sign of engine trouble, losing altitude, but not dropping too far behind my squadron. I could see the 'let go' signal from the leader, so we let the eggs go and then I turned and stretched my glide for the Allied lines. Two Fokkers detached themselves from their formation and followed me down. I looked like cold meat. In fact my feet *were*. And then

Well, well! Here's old Katheleen, the well known DeHavilland, with the flapping owl insignia and everything complete. Please take notice of the healthy prop, swung by the Liberty engine.

I realized that my rear guns weren't working, that their comforting 'tack-tack-tack-tack' was nowhere.

"Had my observer been killed? Just think, a young carefree kid. A dirty shame being bumped off on his first raid, but I hoped he wouldn't slump down on the controls and make things worse. The Fokkers, of course, avoided getting in the way of my front guns, but hung on to my rear. Holes kept coming into the center section and two holes suddenly appeared in the windshield in front of me.

"I ventured a last glance to the rear, —and there my gallant bomb-heaver stood, mouth agape in the morning breeze, looking in an interested way at the two beer-swillers who were trying to finish us off. Great Scott! Did he think this was in fun? Heck, this was aerial gunnery and flying combat for *keeps*. Those two Fokker pilots were honest-to-goodness *mad* at us,—but there stood 'The Dope' mouth agape.

"There was only one thing to bring him out of his trance. I pushed the stick forward, and losing some precious altitude and risking my wings in the dive, slammed him up against the cowling. It woke him up, for he grasped the Lewis guns and sprayed the enemy air with 30 calibre ball and tracers. 'Sprayed,' did I say? *Flooded* the air, what I mean!

"And then, of all things, one Fokker who was darting in at the kill gave a lurch and started spinning down, out of control. The other, after a half-hearted pass at us, turned and rejoined his comrades to the East. I had a little altitude left and used it in gliding down for the only visible clearing in the whole Argonne forest, made it, and stopped the DeH in some barbed wire just a few yards from a deep gully, but it was in French territory and for that day, at least, all was fine.

"With the help of a whole platoon of interested poilus, we traced the

Here is the line-up of the officers of the 166th Aero Squadron with a background of DeHavillands. We would like to get in touch with any or all men shown here.

cause of our engine trouble, which turned out to be lack of gas. A bullet had gone in through one side of the fuselage, struck a cross-member, been deflected, went through the leg of 'The Dope's' pants (without harming him, curse the luck) and then went into the gas tank below the gas level. The ship was one of the old DeH4As, with a gas tank separating pilot and observer.

"Had it gone into the empty portion of the tank with its explosive vapor it would have been fireworks for fair. The bullet had dented, but not quite punctured, the forewall of the tank, and then dropped back into the bottom of the tank from which I later rescued it as a souvenir. Had it also gone through the front wall with any force I'd have eaten many a meal from the mantelpiece, here or in other regions.

"Four days later we were back to our squadron, bound on the second air raid of our career. Just before we got over the lines I saw an American brigade Poste Commande panel and pointed it out to 'The Dope' as something of interest. Immediately, I felt the plane jump ever so slightly, although the air was quite smooth. Looking over the side I watched two 100-pound bombs speed downward and land in a stream near the P. C. that I had pointed out to my observer. That was bad, but I stuck with the formation and went through the motions, returning in good order to the home airdrome.

"Telling my Sandbag to keep his mouth shut I described, in graphic manner to the rest of the boys, just where our bombs had fallen away back in the German reserve area. I think the rest of the formation all had an idea that those bombs that exploded back in Allied territory might have been from *their* particular ship, for they all followed suit describing just where their bombs lit on and around the ammo dump.

"When Brigade HQ. sent a howling blistering letter of accusation against those eggs that had nearly wrecked it, there was no one to blame, not in our flight anyway.

"That night I took off for Nancy on a 24-hour pass. When I waltzed into Madame N's estaminet, who should I see there but my brave bombardier, open-mouthed as usual, gaping at the scenes of gaiety and convivality all around him. It almost spoiled my leave, so instead of reporting back the last minute I left the town at midnight and, accompanied by my buddy (?), found when we reached Ligny by train that we had missed the last GMC bus from there to the airdrome and must needs walk 7 long kilometers.

"At about 4:30 a. m. we arrived there. The place looked a bit different, lined up against the moonlit sky. The sentry, with an ill-concealed grin told us that the officers' quarters had burned down and that all they had contained was lost. Well, I still had a uniform to my back, and the fact that my companion had lost heavily of many spare uniforms and other accouterments heartened me somewhat. Together we tramped over to the Operations Office.

"'Glad you came in,' said our Flight Commander. 'Red' and 'Bigboy' were burned a bit trying to rescue their effects. You two will take their places. Take off in half an hour. Here's the dope,'—and he began his instructions.

"As usual, we were jumped at sunrise as we crossed the lines. I was flying on one end of the V. This time I sure heard the tacking of machine guns behind me. I looked back and couldn't see any planes behind me, but my sandbag was hanging over the side shooting almost straight down. The enemy must be zooming up from underneath, thought I, and why the hell 'The Dope' didn't use his tunnel gun that pointed through the bottom of the fuselage, was beyond me. I looked back again,—and almost passed out.

"The two elevator wires on one side were trailing far behind the flippers shot clean through by our little hero!

"I looked at the other side and the cables were O. K. Fortunately, the flipper-bar on the old DeH ran clear across, and for time being all was well. But then our gallant gunner swung his guns over on the other side, pointed them down at the enemy and pulled the trigger, and believe me I died a mental death. A million of 'em, as the guy says in the movies.

"However, his gun jammed at the third shot and he couldn't clear it or get the magazine pan off the darned thing. I stuck with the flight, the cute little sap in the rear seat came out of his coma long enough to drop our bombs and we headed for home. The lads flying across from me in the seven ship formation helped us out. They were good gunners, steady, reliable fellows and their guns played a stream of bullets across and drove off the tenacious Fokkers who were all set to bring me down.

"When we got back to the lines I stood on my hind legs and roared. My bold boy bombardier was wished off on another pilot, who had just joined the squadron. A new draft of bombardiers had also reported. By this time I was wise in ways of intrigue, and picked out one who was to serve me nobly. He was big and bulky and bulged all around inside the rear cockpit of our DeH. I had learned one thing. Pick your sandbags big and fat. The bigger and fatter they were the more bullets they'd stop. That one bullet my gas tank had stopped up there in the Argonne had taught me something.

"Yes, the new man was a good egg. Bob Lee Brown, of Dallas and I understand he's now a pilot and still flying. Related to the Robert E. Lee of a previous war and as my mother's name was Sherman, we fought the World War in the air and the Civil War in our quarters.

"And my gaping goof of other days? Well, he led his new pilot a great life.

(*Continued on page* 128)

An early Voisin pusher with the pilot-observer-gunner in a very prominent and exposed position for enemy fire.

Bishop—Britain's Super-Ace

by CARL BERNARD OGILVIE

Once more our historian tells of a cavalry officer who became one of the greatest of the World War aces. Bishop, who was a Canadian, is one of the most stirring figures in the war and one of the most valiant fighters.

"Somewhere in France" once stood this flight of 65 Sopwith "1½ Strutters," ready for the next raid in enemy territory.

MARCH 25, 1917. Six days before the most appalling period of all Allied air history—*Bloody April!*

Four trim Nieuports, in perfect "Vee" formation, purred indolently over the shell-raked crumbled enemy's first line of defense. Occasional sunlight cut through overhanging clouds to dance lightly on swirling propeller blades, wing tips, leather helmeted pilots and the red, white and blue cocard of the Royal Flying Corps.

Upstairs, in screening clouds, a deadly flight of Albatros pilots—men handpicked by Baron Manfred von Richthofen for his jadgstaffel—lurked, waiting. Waiting for the right moment to come diving down in swift treacherous attack.

But the British pilots little realized the horror and danger of deadly attack that was at that moment stalking them, waiting to drill their bodies with Spandau lead and splay the heavens with their blood. Least of all was this menace of impending doom apparent to one of the four Britishers—a novice on his first hop over the lines. He probably was too occupied in keeping up flying speed and his ship dressed in formation to realize that near-disaster had already singled him out as its victim.

Red painted planes, bearing the black Maltese cross—trademark of death—were diving down out of the clouds. Diving with full-throttled Mercedes engines roaring a weird freakish hymn of hate.

Instead of seeing this winged threat, the British pilots were making observations below. They saw snakey roads churned to a swirling mud batter by heavily ladened motor trucks, corps and division troop trains, field escort wagons, light and heavy artillery, tractors, tanks and even staff cars, moving at snail's pace. They saw divisions, corps and whole armies of mustard-green uniformed soldiers floundering through the mud, battle-weary, moving back from the awesome nightmare of the Somme; moving back into Hunland and safety.

The sight of that gigantic panorama, 5,000 feet below, pleased the British pilots immensely. Here was a dramatic scene which told that the valiant Allied soldiers had accomplished the seemingly impossible. They had smashed the crushing steam-roller advance of picked shock troops. The unexpected, the unbelievable, as the Germans saw it, had come to pass. The Spring offensive—long heralded as the Huns' final blow which would spell victory for them—had failed.

Germany's greatest armed hope was in a panic of disorderly retreat. Dazed, bewildered, yet still a great strategist, Field Marshal von Hindenburg saw that the Air Force was his only salvation. In desperation he ordered every available man and plane into the air. Ordered they be kept there, at all cost, until the German armies could be reorganized.

Even now, as the Albatros flight came diving down on the British Nieuport flight, they were carrying out the desperate orders of their field marshal. That swift attack was the first of a terrible series which was to drench the battle skies with the blood of brave Allied pilots and to be written in the annals of war aviation as "Bloody April."

TRACERS flacked through Nieuport fabric. This was the first inkling the British pilots had that winged destruction, like a thunderbolt, was crashing down out of the heavens upon them.

The Nieuport formation immediately broke up. Every man for himself. The flight leader, veering off, signaled to the novice pilot to withdraw from the dog-fight. It was a custom of the British to instruct new pilots to pull out of melees so that the beginners could observe them and thereby learn how to defend themselves. This novice had been specifically warned not to take part in any fight that might occur during the flight.

But the flight leader did not know the metal of the novice—Lieutenant William A. Bishop—former artillery observer and Home Defense Zeppelin Chaser—who, before he took to the cockpit and joystick, rode saddle and maneuvered a horse by means of curbbit and bridle-reins.

Bishop deliberately disobeyed the order of his superior officer by dressing his ship and sending it at full speed at

the nearest Albatros. Bishop was at a disadvantage from the start. His Nieuport, with its parasitic drag of a wing-mounted Lewis machine gun, was at least twenty miles an hour slower than the Albatros III.

Through a hail of Spandau lead he vaulted to respond to the Hun's challenge. The enemy pilot, a veteran of many a dog-fight, was amazed to find himself almost instantly at a disadvantage. Pretending that he had been hit, he sent his Albatros down in a dive. Aware of that crafty Hun trick, Bishop rode the tail of the Albatros down for 1,000 feet.

His head was cool, his eyes clear, he was in complete command of himself and his plane, but within him a great heat burned. The fires of hatred for a foe he detested for his cowardice. And, in this first dive, the Canadian novice-pilot was displaying the admirable qualities of cool-headedness, rare courage, a strong fighting heart and excellent marksmanship which, within a few brief months, were to make him world famous as England's greatest fighting ace.

Over-anxious to win his first victory, Bishop courted disaster. He closed in until his prop was so close to the faking Hun that, had Bishop not been on the alert, he would have crashed into the Albatros when the Hun pulled out of his dive. Up came the nose of the Albatros suddenly. Bishop watching, redressed his ship. The pilot of the Albatros danced in his ring sights. Bishop knew it was now or never. His Lewis barked and shook on the upper wing.

The Albatros paused, trembling from stem to stern, then went into a vertical dive. The Canadian, suspecting another ruse to escape, again followed the Albatros earthward. But the Hun was beyond faking. He was mortally wounded.

Bishop's first victory crashed with terrific impact.

BUT Bishop's elation, a normal reaction of a war pilot after downing his first victim, was quickly dampened. He had to struggle with the flimsy little Nieuport to ease it out of is perilous headlong dive. And just when he finally did succeed, his engine conked! During the long dive, the engine had become flooded with lubricating oil. Now Bishop had a dead engine and dead stick to fight—two of the most dangerous enemies known to the best of pilots.

He tried every trick he knew to coax the engine to perk. It wouldn't catch. It was then Bishop realized that he faced one of the most dreaded hazards of the World War—a forced dead-stick landing on shell-pocked ground. And the region beneath him was Hunland!

His heart was lead as he worked the controls to nurse the faltering Nieuport over Hunland toward the distant British lines. Yet, even as he worked desperately, with the specter of death or being taken prisoner hovering over him, he realized that he lacked sufficient elevation and flying speed to glide back to his lines.

Nursing the sinking plane to the last, he was forced to pancake into a demolished French village well within Hunland. He could see a German trench near by. Soon mustard-green clad soldiers would be swarming out of the trench to take him prisoner. Bishop was unarmed! He decided to bluff off capture as long as possible with his Very pistol, designed only to fire signals. You can imagine his utter amazement and relief when he saw British soldiers coming out of the German trench toward him.

Tommy Atkins, sweeping forward, had captured the German trench less than an hour before. Only by a narrow margin, bordering on the miraculous, had Bishop been saved from a prison camp. By only a slim margin of one hundred yards had he managed to coax his dead engine behind the British advanced line of defense. Even a mild head wind would have changed all this good fortune. Bishop would have been in a German prison camp for the duration of the war. England and the world would never have known of Colonel William A. Bishop, V.C.

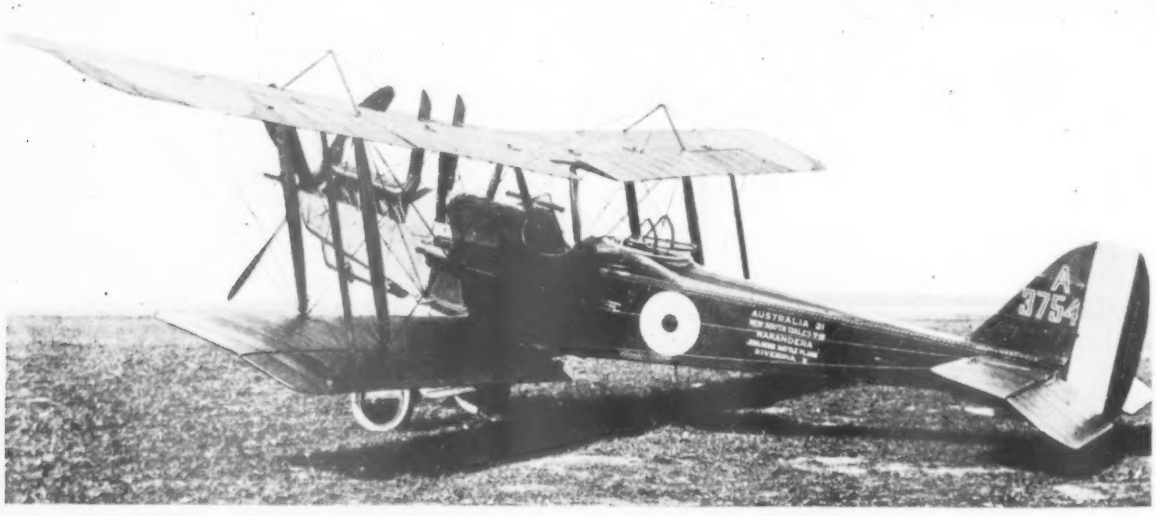
THEN came Bloody April, when every hour of daylight saw the heavens studded with enemy and Allied planes, locked in deadly combat and scores and scores of British airmen gave their life's blood for King and Country.

Bishop, the novice, became Bishop the young Canadian Ace, twice over. He flung himself into the bloody fray with the zest of a true patriot and hero. He went diving down on sausage balloons; wiped out machine gun nests; strafed columns of troops, trains, munition dumps and proved himself to be the most courageous, daring, yet skillful of pilots in the Royal Flying Corps. He was unquestionably its best marksman.

In the midst of this high carnival of bloody aerial battles, the Fighting Bishop fought nine separate battles within an hour and forty-five minutes! He shot down five enemy planes that day. He experienced the narrowest escape from death that April day when the all highest war-lord of the jadgstaffels, Baron Manfred von Richthofen, refused to fight the Canadian.

Bishop, with a British pilot, daringly attacked a flight of five red painted Albatros. The Hun flight immediately broke up. Bishop, not yet sufficiently experienced to realize the break-up was a trick, that the Baron was waiting above to dive on him unexpectedly, was enraged at the Huns' refusal to fight. Then, as the furious Canadian was endeavoring to overtake the nearest Hun, the bloody killer von Richthofen came hurtling down, guarded on both sides and rear by faithful cohorts.

(*Continued on page* 122)



Here is an old-time "RE-8", a picture that you seldom see or a plane that you seldom hear of, but it was well known during the World War.

The Coast Guards In the Air

by LOU HEAD

The planes of the army and navy fight during a war. The planes of the Coast Guard are always in action, peacetime or wartime, policing, rendering assistance in times of trouble or running errands of mercy.

OUT of the storm of high winds and waves comes the frantic S. O. S. A ship in distress! Lives at stake! Cargoes menaced!

Ever-alert ears catch the signal as it is flung over the ether waves. Motors roar. Pilots shrug on coats and helmets. Planes soar away from coast airbases. The United States Coast Guard Flying Boats are off! And another hundred lives are saved. Another million dollars salvaged.

The scene? Any point along the Atlantic or Pacific coasts or in the Gulf of Mexico.

Dramatic to the spectator. Routine to the seagoing flyers comprising the small but efficient air service of the Coast Guard.

And now, Uncle Sam, answering the whirr of those small wings fostered during the last decade, wants more lives saved and more cargoes wrenched from Davy Jones' locker. So more airplanes—flying boats—are being built. More coast airports for the Coast Guard are under construction, and one of the greatest steps toward modernization of Uncle Sam's busiest sea force is being taken. And another laurel for aviation advancement is being made.

It was in 1915 that two Coast Guard officers first visioned what wings could do for the service. Sensing the often evident futility of surface craft searching blindly for disabled vessels, these two farseeing men, Lieutenant Hall and Ensign E. F. Stone, began talking of an air force. The Curtiss Corporation had established a flying school at Newport News, Virginia. There Lieutenant Hall became a student. In August, 1916, his dream became a reality when that company placed an experimental plane at his disposal. In March of that same year, Stone managed to be transferred for flight training to Pensacola, Florida. In the World War Stone saw active service in Europe as a pilot and returned to this country full of ideas for utilizing aircraft in the Coast Guard.

A Douglas "Dolphin" with Wasp engines as supplied to the U. S. Coast Guard.

These initial steps were encouraged when, on August 29, 1916, Congress authorized the establishment of ten Coast Guard air stations. Unfortunately funds were not allotted and it was not until February of 1920 that the first wing feather actually sprouted when the Coast Guard took over an abandoned naval air station at Morehead City, North Carolina, and operated planes loaned by the Navy. The Morehead City station limped along until August, 1921. The feather then molted because of lack of funds.

Then, in 1925, a third Coast Guard officer came along with ideas akin to those of his two brother officers. He was Lieutenant Commander C. C. von Paulsen. He had trained at Pensacola also. It was in July, 1925, that von Paulsen was assigned to the Coast Guard Section Base at Gloucester, Mass. Under his persuasion and drive an air station there was developed and an appropriation obtained, approximating $150,000 for five airplanes, from Congress.

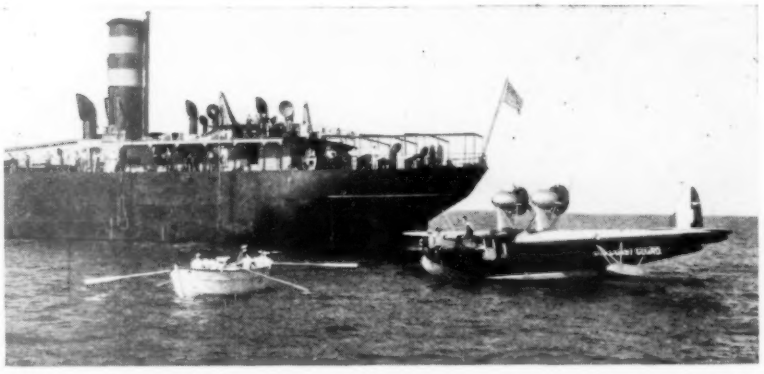
In his "Flying Boat of the Coast Guard," Colonel Harold C. Resinger, U. S. Marine Corps, painted a picture of these Coast Guard air pioneers when he wrote, "Throughout that bleak winter, von Paulsen and his men, like Washington at Valley Forge, kept the spark alive. The station had meager facilities—a tent hangar borrowed from the Navy. Their airplanes operated along the cold New England coast from this canvas hangar base."

A dismal beginning for this flying chick. But those officers and men making up that nucleus, had persistence and this finally won when in November, 1928, a Coast Guard Aviation Section was created with Commander Hall as chief. Under Hall's guidance in 1929 an appropriation of $144,000 was secured for construction of more modern planes. Slowly designs and equipment were being evolved best suited to the life saving and dangerous work encountered by the intrepid Coast Guardsmen.

In 1932 another step — additional funds were allotted. The wings were taking shape. The ceiling was lifted. Now the Coast Guard was given three Douglas transport amphibians and five custom built designed flying boats to aid their small force. But still, air bases for these planes were lacking. Of the ten stations authorized in 1916 only one had been completed at Miami, Florida.

Then Washington apparently glanced over the surprising figures compiled annually by the Coast Guard showing that during 1932, 5,214 persons had been rescued from peril; that 6,393 vessels had been assisted; and that cargoes saved through Coast Guard efforts were valued at $39,177,247.

If this could be done with only sur-



A boat from the Samuel Q. Brown, carrying a stretcher case, approaching the Coast Guard plane "Antares."

face craft and pin-feathers, what could be accomplished with wings of mature spread and strength? So now there are bases at Dinner Key near Miami, Florida; Gloucester, Mass.; and Cape May, New Jersey, with attachments of eleven flying boats. Included are three Douglas amphibians, five general aviation flying boats and three smaller planes.

And are the wings growing? On March 9, 1934, the Secretary of Treasury directed that all aviation activities of the Treasury Department be consolidated under one head. What did that mean? That all planes of miscellaneous types and their equipment, belonging to the Customs Service, be transferred to the Coast Guard. A decided forward movement for the air force.

Three Coast Guard air patrol detachments have been established, located at Buffalo, New York; San Antonio, Texas; and San Diego, California. These detachments have as their principal duties the combatment of smuggling activities over the Canadian and Mexicon borders.

In addition, during the fiscal year of 1934, six landplanes of the 02U-2 type were transferred from the Navy to the Coast Guard. Twenty commissioned officers were undergoing flight training at the Naval Air Station at Pensacola on June 30, 1934. Thirty enlisted men were sent there during the year for flight training. A school for the training of enlisted men for aviation ratings in the Coast Guard was established at the Cape May Coast Guard Air Station in New Jersey.

Things are looking up for the Coast Guard eaglet.

Then, as if in answer to all the years of hard work and fortitude shown by that handful of air-minded Coast Guard officers, a program for the construction of twenty-five amphibian airplanes was authorized.

Erection of four new air stations, at Salem, Mass.; St. Petersburg, Florida; Biloxi, Mississippi; and Ediz Hook, Port Angelus, Washington, was authorized and funds allocated. Construction work was ordered and is under way.

Interior of the fine hangar at the U. S. Coast Guard station, Miami, Fla.

Contracts were awarded for the building of ten Douglas Dolphins and nine Grumman amphibians. These will be spread over the United States at the old and new air bases dotting the coast lines from old St. Petersburg in Florida to the Tugboat Annie country around Puget Sound. Equipped for life saving and not life taking, these planes will soar through murky and sunny skies in search of aid-seeking surface vessels.

The Dolphins were being constructed in the Douglas Aircraft plant at Clover Field, Santa Monica, California. Fitting enough, the Coast Guard inspector, assigned to supervise the building of this miniature armada is Stone, now a lieutenant commander.

These ships have a cruising range of 600 miles; are powered with two Wasp motors and will accommodate a crew of three and a rescue load of six passengers. No armament is included but they will be convertible to wartime craft. Specifications show a sixty-foot wing span and latest radio equipment.

The establishment of the air base at Port Angelus will inaugurate the first Coast Guard air activities for ocean patrol on the West Coast.

And still the wings grow. The Federal Emergency Public Works Administration allotted $250,000 for the construction of a Coast Guard Station at Charleston, South Carolina.

In Southern California, an attempt, first initiated in 1932, is still being carried on to locate an air station at San Pedro or San Diego. In 1932 a fund of $37,000 was appropriated for establishment of sea hangars and base at San Pedro. Negotiations with the harbor department there failed to yield satisfactory terms for land acquisition and the project was abandoned. The effort is now concentrated at San Diego, where an air base may be located for both rescue squadrons and border patrols.

A peak at figures on the Coast Guard air force for the fiscal year ending June 30, 1934, proves interesting. They show that Coast Guard airplanes cruised 219,572 miles and searched over an area of 1,975,015 miles. The planes were in the air for 2,752 hours and 5,494 vessels and planes were identified. Through the checking and reporting system created by the service, along the Atlantic seaboard alone, 11,592 airplanes were reported and watched.

Behind these dry figures lies the never-ceasing patrol work taken up by the Coast Guard airmen—a definite and comprehensive barrier towards lost planes and ships. It means that in many cases of distress there need be no search—the Coast Guard knows where they are. In addition, the aircraft division has given assistance in innumerable cases, transporting critically ill or injured persons at sea to shore hospitals, rushed serums and oxygen tanks to hospitals, located lost, missing or overdue vessels and boats; and detected boats engaged in smuggling of contraband and aliens.

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U-202 type plane transferred to the U. S. Coast Guard by the U. S. Navy, for border patrol work.

Does Lightning Menace Planes

by S. R. WINTERS

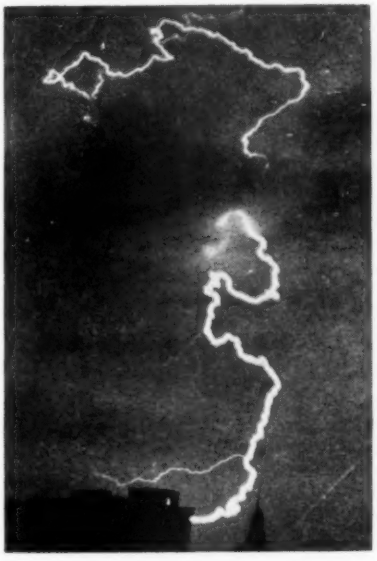
This alleged menace has been subject to debate for a long time, but here the author reviews a report to the National Advisory Committee of Aeronautics on the lightning hazard.

IN A RECENT report to the National Advisory Committee for Aeronautics, a special committee of aeronautical authorities investigating possible hazards to aircraft caused by electrical storms has found that airplanes and airships of proper construction are in little danger from lightning.

The committtee considers the probability small that serious damage will result from either of the two types of electrical perils which have been frequently regarded as the most dangerous, with estimates as to the magnitudes of their causes and their effects varying over a wide range. These two electrical hazards to aircraft are constituted in electro-static attraction to earth and high-frequency discharges.

With regard to electrostatic attraction of an airship to the earth, it was generally agreed that an attractive force of this character cannot reach dangerous proportions. Electrostatic attraction may be produced by the electrically-conducting portions of the airship structure which are suspended in the electric field between clouds and earth by an accumulation of electrostatic charge in flight, or by continuous positively charged rain.

Under usual circumstances, the ordinary process of electrostatic induction permits the separation of negative charges on the upper surfaces and positive charges on the lower surfaces of the airship, this factor taking care of the electrically-conducting portions of aircraft structure. If, for any reason, the negative charge were to be removed or scattered, there would be an attraction between the remaining positive charge and the earth.



This flash is toward the observer. Note the short side flashes.

However, according to Dr. G. C. Simpson, of the British Aeronautical Research Committee, the magnitude of this charge is only a few hundred pounds and is, therefore, relatively negligible in value. The estimate of Dr. Simpson, which was approved by the committtee, is based on the gradient, usually found just preceding lightning discharge in thunderstorms, of 100,000 volts per meter. There was some opinion that in extreme cases of field intensity of this type of force might rise to higher values than that given in the estimate. But even by granting a factor of two or three or more at this point, it was agreed that resulting attractive force to the earth would not develop dangerous values.

Introduction of evidence that an airship in flight may accumulate an electrostatic charge likewise provided ample proof that the magnitude of such an accumulated charge is not great. Indication of a discharge between mooring ropes and earth, as the airship descends, has been noted by the man grasping the rope, but the shocks experienced have not been fatal and are likely to be regarded as being of minor importance. It is highly improbable that an airship can gather any considerable charge, owing first of all to the many exposed metallic points of short radius of curvature facilitating discharge, and more especially to the highly ionized conditions of the exhaust gases from the engines.

Possibility that continuous positively charged rain could produce an accumulation of higher values of electrostatic charge seemed remote due to the lack of water retention upon the airship's surface. Since the electrostatic charge contained in the average rain drop is known, estimates were made of the total charge to be found in a layer of rain water of the maximum thickness which the airship's surface is capable of retaining.

Despite continuous rain, accumulation of a large positive charge is impossible with the surface retention provided and the passing off of the excess water which carries with it the corresponding charge. On the basis of this review, the committee concluded that the maximum attractive force to the earth possessed the approximate magnitude of that computed for induced charges and, in like manner was of little consequence. In any event, it was generally agreed that electrostatic attraction of an airship to the earth could not reach any startling proportions.

In the case of the second electrical hazard to aircraft, namely, high-frequency discharges, the special committee reported the utilization of the customary protective methods inherent in bonded metallic cage construction and the reeling in of trailing radio antenna and cables eliminated probability of serious damage.

The committee was convinced that the metal framework of any aircraft

The Empire State Building, New York, stands out against these multiple flashes.

Another multiple flash taken in New York. Ionizing flash at right.

presents a high degree of internal protection against the effects of lightning discharges and for that reason an all-metal airplane is safer than one in which wood and fabrics are used. Following a review of reports of lightning damage to airplanes in flight, it was found possible to render an airplane practically immune to serious danger either to plane or to occupants, the immunity being accomplished without complications.

Radio antennas provided an exception to this conclusion, for there is excellent evidence that a trailing antenna during a thunderstorm increases the likelihood of a lightning discharge through the body of the aircraft. In such an instance the antenna may be burned off, or complete destruction of radio equipment inside the airplane may result. Simple protective measures against each of these hazards are available, thus eliminating the necessity for exposure to danger during stormy weather.

Internal protection against lightning discharges within an airship are afforded by close meshes of the metallic framework, wire bracing, wire netting enclosing the gas bags, and particularly the more highly conducting the surface of the outer envelope. Since this outer surface is non-conducting electrically and the metal framework, wire bracing and wire netting have meshes of definite area, a theory was advanced that high-frequency disturbances might penetrate to the inside of the airship and set up sufficiently high values of electrical potential difference to cause discharges and consequent damage.

Two possibilities are presented, quoting from the report: "First, that for a discharge through the metal structure of the airship of a steep wave front (corresponding to short-wave length as compared to dimensions of the airship) potential difference due to the passage of current through the metal framework may cause differences of potential between the different parts of the airship; second, that a direct stroke to the airship might actually enter the area of the open mesh between the airship members, passing to some electrically conducting member inside the outer framework.

"As a particular case involving possible extreme hazard, it was suggested that condensation of water on the inner surfaces of the gas bags might constitute an interior electrical conductor which might receive a direct or indirect stroke due to a high-frequency disturbance. It was suggested that such stroke would puncture the gas bag electrically, leading to leakage and possible destruction. Evidence of the possibility of this type of disturbance was limited to the well-known behavior of electric circuits under high-frequency resonance disturbance, in which large differences of potential and at times electric discharges are observed between points on

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The New Rose Parakeet A-1 Appears

Three-quarters front view of the Rose Parakeet A-1 equipped with a Continental A-40 engine. This sturdy little plane is well adapted for private flying, as an economical trainer or for running up time.

THE Rose Aeroplane and Motor Company, Chicago, Ill., have produced the new model of the Rose Parakeet, Model A-1, which has been attracting a considerable amount of attention at Chicago Airports.

The Parakeet is a fine looking single-seat biplane that puts up a remarkable performance and which really looks like a full size airplane, which is not the case with many of the lightplanes now being produced. It has a top speed of 100 m.p.h., cruising speed 85 m.p.h. and a landing speed of 35 m.p.h. It is now powered with a Continental A-40 although the Rose Aeroplane Company are about to begin production on the new Rose motor.

The wing span is only 20-feet and the length is 17'-6" which is small enough for parking in many double garages. This compact wing span is made possible by the biplane construction and it does not involve folding the wings or other tedious operations. It is listed at $975.00, flyaway, Chicago, Ill., this low price being made possible by the fact that there are no agents nor dealers' commissions to pay, the sales being handled exclusively by the factory.

The biplane construction makes it a rugged ship that will withstand much rough handling and this, of course, makes it an excellent ship for training and running up time where a strong but economical ship is most desirable. The wing structure is particularly strong and well constructed with adequate ribs and tie-rods.

The wings are of wood construction with solid spruce spars, so constructed and braced that no warping nor distortion is possible under any conditions. The wing section is maintained exactly with varying weather phases. For the sake of portability the wings are quickly assembled and dissembled, a fact that will interest most amateurs who are so situated that they must tow their ship frequently.

A conventional type of welded steel fuselage, a very rugged structure, is used, fabric covered. There is a surprising amount of room.

Front view of Rose Parakeet A-1 showing the exceptionally strong landing-gear and wing bracing system. This ship has been under development for some time by an experienced pilot and flying instructor.

The American Gyro Crusader

by E. STANTON BROWN

In the design of an airplane without the conventional long fuselage, there are many points of merit that are brought out in the American Gyro Crusader. This type permits of better streamlining and better air-stream distribution over the tail group.

FLIGHT tests have been conducted on the new "Crusader," a low-wing, four-place, twin-engine, high-performance cabin monoplane of exceptionally clean design.

The ship, the first of its type, was designed by Thomas M. Shelton and built by the American Gyro Company of Denver. The American Gyro Company for the past four years has been engaged in the manufacture of automotive accessories and is now branching out into the aeronautical field. The "Crusader" model will soon be available for the private owner or the airline operator, both in the four-and six-place class.

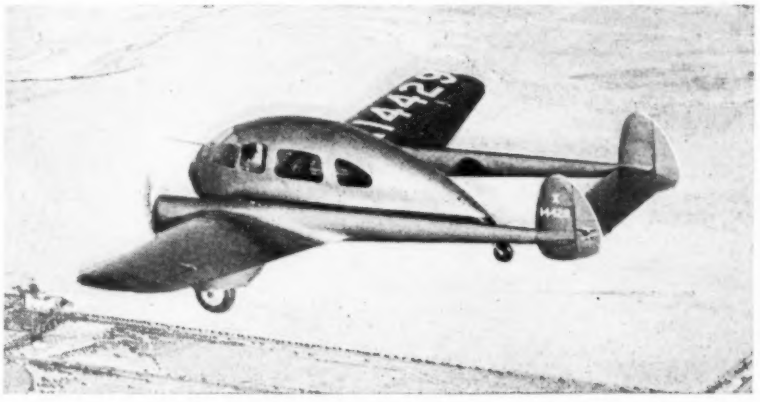
The ship is all metal with the exception of the wing tips and the control surfaces, 17 ST. duraluminum being used throughout for the skin.

The center-section, which embraces the engine nacelles, landing-gear, fuel tanks, and cabin compartment, takes up twelve feet of the wing's thirty-six foot span, which is full cantilever, semi-stressed skin type. There are two detachable outer wing panels, removable from points outboard of the engine nacelles. In the event of damage, new panels may be bolted in place, secured by four heat treated steel taper pins.

Two twenty-five gallon fuel tanks are located in the center-section on either side of the cabin, and valves are arranged so that fuel can be drained from either one of the tanks separately or collectively for either engine. Either engine can draw from either tank or both tanks.

A trailing edge flap, manually operated, extends from the body outwards to the inner edge of the ailerons. The ailerons, as well as the other control surfaces, are mass balanced to insure against flutter at high speeds.

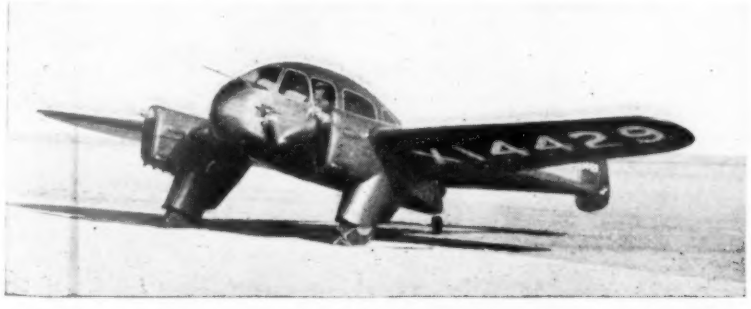
The cabin, which seats four passengers, is quite roomy, having an average width of four feet. Entrance is effected by a door on the right side of the cabin, the opening of which extends part way up around the top, thus eliminating the undesirable characteristics present in most small, low-wing ships with doors opening into the side from the top of the surface. Even with this cut out, the cabin is amply stressed to protect the occupants in case of nose over.



The American Gyro Crusader in flight showing the tail-group supported by the outriggers and the short body which has an ideal fairness ratio.

The entire cabin covering, as well as the other surfaces, are fabricated by using flush type rivets.

One-eighth inch Plastecele is used for the windows, the arrangement of which affords the pilot and passengers with exceptionally fine visibility in most all directions, a feature in favor of this type of design. Plastecele was used because of its low weight and replacement cost, as compared with glass and because it can be readily molded to fit smoothly into the streamline body, the shape of which is such that considerable lift is effected over its surface when the ship is in flight, thus making the body do its share toward supporting the ship's load in addition to its serving as a compartment to protect the occupants from the elements.



Front view of the Crusader. Note the location of the tail-wheel at the rear of the nacelle.

Tests are being run with a fixed and a retractable landing-gear. For the retraction, the wheels of the streamline type, each being supported by two oil spring shock struts, fold up backwards and when in the retracted position, complete the streamlining behind the engine nacelles. Retraction is accomplished hydraulically. Twelve seconds time is required for complete retraction and eight seconds for lowering the gear into its landing position. Hydraulic brakes are also used. The tail wheel, also of the streamline type, is mounted on a fork which is free to rotate through 360 degrees, yet its swing is dampened by a friction plate. The shock is absorbed by the low-pressure tire and shock chord.

Despite the wide tread of ten feet and the short distance the tail wheel is back of the front wheels, the ship is quite stable on the ground, having not the slightest tendency to ground loop.

The horizontal and vertical control surfaces are supported at the end of two exceptionally stiff, taper elliptical duraluminum tubes of semi-stressed skin construction. They fair neatly into the wing behind each engine nacelle, affording a recess into which the wheels fit when retracted.

The ship is powered with two 125 h.p. Menasco, four-cylinder inverted engines, super-charged to develop 156 rated horsepower at sea-level.

The workmanship on the plane is very neat; the whole plane, despite its rather unusual lines, has a pleasing, efficient and clean appearance. The color scheme is metallic-copper, with white trim, and interior upholstery, green leather.

The instrument panel is illuminated for night flying and contains all the

regulation engine and flight indication devices. The engine instruments and flight instruments are grouped together in such a manner as to give the board a neat symetrical appearance.

The results from preliminary flight tests made so far, using temporary fixed pitched propellers, give the officials of the American Gyro Company every reason to believe that the design will meet their expectations. On its initial flight, the ship took off from the Denver Municipal Airport (5,000 feet altitude) in eight seconds. It lands with a speed of about 60 m.p.h. at this altitude. The ship is quite fast for its power, especially when using only one engine.

A tour to sea-level is anticipated where Briner controllable pitch propellers will be installed, and performance tests continued at sea-level.

A model of this ship, known in its early design stages as the Shelton Flying-Wing, was wind tunnel tested at New York University in June of 1933, from which the following performance figures were obtained:

High speed, sea-level, 2 engines—233 m.p.h.

High speed, sea-level, 1 engine stopped—150 m.p.h.

Landing speed, sea-level—55 m.p.h.

The following are the figures on dimensions, areas, etc.:

Span, 36′ 0″.

Area, 206 sq. ft.

Length, overall, 21′ 7⅞″.

Height, overall, 7′ 3¼″.

Treat, 10′.

Gross weight, 3,000 lbs.

Useful load, 1,000 lbs.

Weight, empty, 2,000 lbs.

Wind loading, 14.55 lbs. sq. ft.

Power loading, 9.6 lbs. h.p.

It will be remembered that a very similar type of ship was built out on the coast about two years ago, but which was intended for carrying mail and express. Very little dope was had on its performance, however, possibly for the reason that its designer died before it was completed.

One of the great advantages of this type of ship, at least from a theoretical standpoint is the fact that a short nacelle offers less resistance than a long fuselage. The least resistance is experienced when the length of the nacelle ranges from four to five times its diameter. A body with these proportions or "fairness ratio" can be more perfectly streamlined than a long tapering body such as the conventional fuselage.

Again, the tail-group is not "shaded" by the wake of the fuselage, the tail-group surfaces are therefore more effective and are not so subject to tail flutter or the effects of buffeting. It is also claimed that the tendency toward spinning, particularly flat spinning, is much reduced.

END.

Sky-Train Drops Glider in Havana

Jack O'Meara's Glider lands in Havana Prado.

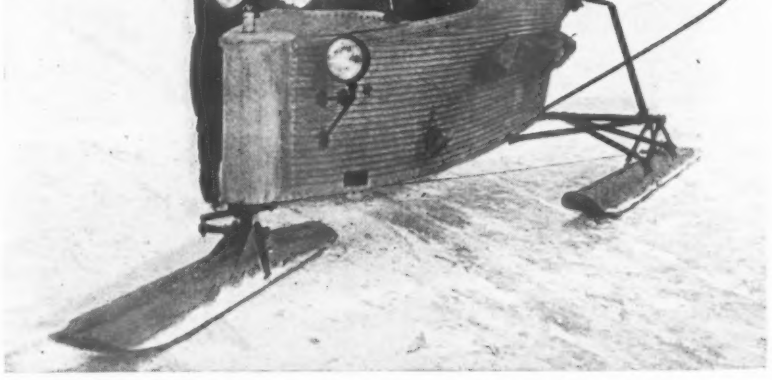
A PRACTICAL demonstration of a "sky-train" of gliders, tower by an airplane, was given by Pan American Airways. After a 300-mile flight from Miami, Fla., to Havana, Cuba, two of the gliders released themselves from the tow-plane and glided to earth at Havana.

The glider piloted by Jack O'Meara, landed on the Prado in front of the capitol building as shown in the photograph. It attracted such a mob that a near riot resulted and the police had to charge the mob with their horses before the road could be cleared and the pilot could be rescued. Ten persons were sent to the hospital, not by reason of the glider but by the action of the mob and the police charge.

This Russian Power Sled Shows Speed

THIS Russian propeller driven sled is supposed to be the last word in arctic transportation. This is a production job that is seeing service in Siberia and northern Russia where the ice and snow lingers for the greater part of the year.

It is of typical airplane construction with a pusher propeller and a well streamlined metal body. The speed is said to reach 200 kilometers per hour (120 m.p.h.) on favorable icy surfaces and it can navigate on fairly soft snow. It would seem that such a sled would be an excellent military weapon in the northern countries, for it could be armored like a tank.



This is a carefully designed Russian power snow sled that develops 120 m.p.h.

Major de Seversky — Engineer

by JAMES FARBER

The author has given us an interesting and authentic story of this versatile aeronautic engineer who, after harrowing experiences in Russia, has become a citizen of the United States, and likes it.

THIS is the story of Major Alexander de Seversky, premier Russian naval ace, one of the world's foremost inventors and one of the nation's fastest flying citizens, related exclusively to your reporter for POPULAR AVIATION.

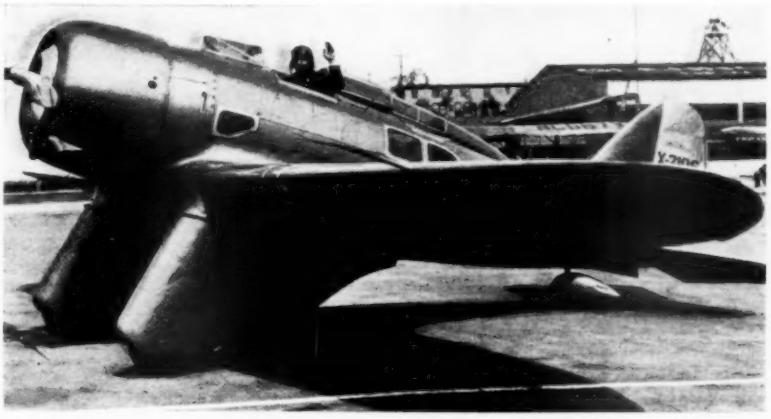
He is, it might be said, one of those remarkable phenomena among men who, with but a slight twitch of the imagination, might be called America's Flying Stepsons. In this semi-filial role are many men who have come to these fine shores either to continue careers already made glamorous by their own aeronautical deeds, or to get a start in the big aerial swim here that might not have been afforded them abroad.

It is, for instance, quite conceivable that with all the boasted success of the Five Year (renewed) Plan in Russia, men like de Seversky might never have come to the top. It is not, one gathers, a nation that permits individual self-exploitation. Who hears of anyone in Russia today except the mythical Stalin?

It was, perhaps, in some respects, even more of a one-man country back in 1894 when, in the town of Tiflis, a bouncing, black-eyed boy came tumbling into the world to the joy of one of the locality's leading families the de Severskys. Some of the things those black eyes—which were to grow keener with passing years—were to witness, is the subject matter with which we are concerned.

As interesting as it might be to delve into the boyhood and early manhood of young de Seversky, it is hardly our aeronautical concern at the moment and we would do better to skip that interval of time ending with his appointment to the Imperial Naval Academy. It is also safe to assume that his four years in that institution were spent much as any young collegian does. We find that he was duly graduated and promptly embarked himself on a post graduate tour of study in the post-grad department of the School of Military and Naval Aeronautics.

A closeup of Major P. de Seversky.



Major de Seversky seated in his famous plane, the SEV-3. This ship was then in its experimental stages.

Meet, then, in late June, 1915, Lieutenant Alexander P. de Seversky, Russian Navy, attached to the Baltic fleet's co-ordinating Second Bombing Squadron. An auspicious beginning.

On the evening of July 2, the young man met an experience that would have licked any ordinary man. The story of that dramatic—even horrible event—will convince you of the man's mettle:

Lieut. de Seversky, with an observer was hovering high above a German war vessel. It was night but pilot and observer had peeled eyes. Shoving the stick of his plane forward and at the same time giving its motor full throttle, the youngster roared into a headlong dive. He let go several deadly eggs from his bomb racks. Two hits were scored on the vessel's steel back.

Then—a thousand-to-one shot. The gunboat was busy with its anti-aircraft. The rocketing plane was caught in a shell burst. Shattered, it hurtled into the sea with its human freight. The icy waters revived the stunned—and miraculously preserved—de Seversky. Clinging to a pontoon of his demolished plane, he shouted his observer's name. But the inky waters had closed forever over his head. De Seversky hoisted himself to a sitting posture on the pontoon. As he began to thaw out, he felt a growing pain in his leg. He examined it with groping fingers. It was off at the knee!

As the full meaning of his plight grew in his mind, de Seversky tells us that suicide in the watery bier so close at hand was his one consuming thought. It was the end, so he believed, of his aviation days. Self-destruction seemed the only way out.

But fate once again intervened. A Russian gunboat, attracted by the flash and noise of the explosion of the plane's bombs as it fell into the sea, bore down on the miserable pilot. Thought of suicide vanished. Whatever was in store for him, he tells us, he unhappily resolved to face.

While he was in the hospital at Kronstadt, he was visited by the great Alexander Touchkoff, the Czar's naval aviation head. The great man heard the stricken flyer's plea to be sent back to the front lines again. He gravely wagged his massive bushy head. He admitted he was touched by the eloquence of the plea. He would see what he could do. De Seversky had to content himself with that.

But on his release from the hospital, the young man found an appointment awaiting him as general inspector of naval aircraft for the Petrograd district. It would be his duty to inspect and pass upon the aeronautical qualifications of all new flying equipment to be used by the naval forces in that area. Now, with some men, the only satisfactory test of an airplane is to fly it. Just a quaint idea, but it does have its advantages. De Seversky was of that mind—it might be said of a

very enthusiastic and determined mind. He would fly a plane, come what might.

Early one morning during an inspection tour in which he was to pass on a new type ship, de Seversky slipped out to its hangar. He knew perfectly well that regulations forbade the consummation of any such "hazardous" act. To quaking mechanics he roared his orders to "wind her up," and threatened them with the personal displeasure of the Czar if they disobeyed the orders of one of his officers.

High into skies he climbed. By this time he had a good audience. And the audience had something really good to watch. Every evolution known then to flying men was performed by the new ship and its hardy young master. When he finally came down he was put under arrest for "endangering government property!"

In those days a "friend at court" had a very real meaning. The phrase has little meaning, except figuratively, in today's liberalized world. De Seversky fortunately had a few among Czar Nicholas' advisors. He lost no time in getting in touch with them. His appeal was carried before Nicholas himself. Far from angered at the act of endangering government property, Majesty was at first touched at what appeared to be a youthful escapade. His advisors assured him it was more than that. It was the deed of a brave man and a loyal subject. He deserved a reward instead of a punishment.

Czar Nicholas ordered him to report for flying duty!

And in the Spring of 1916 he received from his liege lord's own hands a gold sword for bravery.

This, however, was after his return to the front. As a squadron commander he began a species of individual combat heretofore little known on the far flung Eastern front. On one occasion he shot down two enemy aircraft in a single day. This is all the more remarkable in that German pilots were wily fighters and preferred to accomplish military missions with a minimum risk of life. It was a well-defined policy in the German flying corps, both on the Eastern and Western fronts and had nothing to do with the equation of personal bravery. But it did have the effect of throwing a damper on the enthusiasm of Allied pilots chafing to risk their necks to destroy an elusive enemy.

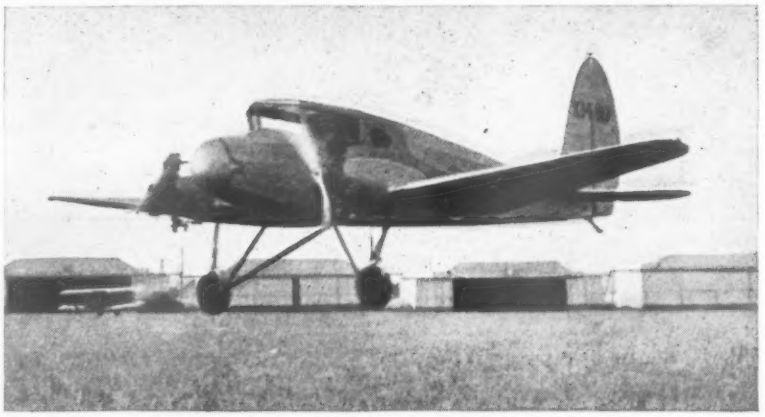
The year 1917 which proved so dramatically troublous for the vast domains of the Russian empire and led eventually to its resounding crash was likewise an adventurous one for young de Seversky.

He had perfected the first successful bomb sight and had installed it on all bombing craft in the Russian military services. He had directed the overhauling of all naval planes and had devised the use of skiis on landing gear.

Outside the Russian lines the German threat was becoming well nigh irresistible. Ceaselessly the waves of grey pounded on the weakening forces of the

(*Continued on page* 116)

The Fuller-Hammond Bimotored Sportplane



A take-off with the new bimotored sportplane described below.

FOR the past two years or so, there seems to be a marked tendency toward multimotored lightplanes and sportplanes. The Fuller-Hammond bimotored plane shown here is one example of the new trend developed in Los Angeles, Calif., by George B. Fuller, Wilbur A. Hammond and associates.

This plane is provided with two Kinner 3-cylinder radial engines mounted on the wings by means of streamlined nacelles. The arrangement has the advantage of improving the visual range of the pilot and improving the acceleration and take-off, but whether the two engines increase the safety of the plane, in the event of engine trouble, is difficult to say.

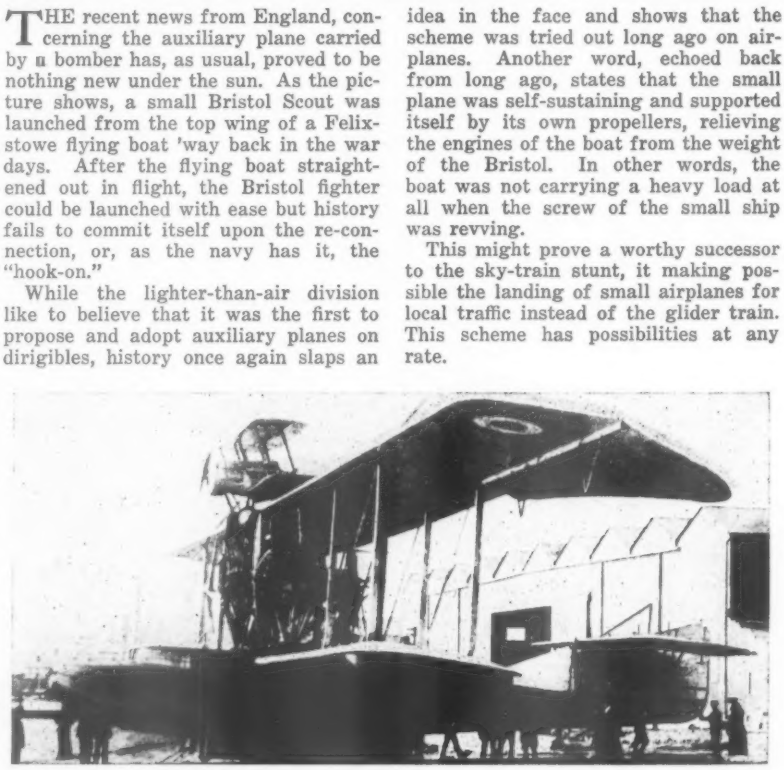
It is designed for the low-priced sportplane field and is a full cabin job of good performance and sturdy construction.

A Wartime Auxiliary Plane Arrangement

THE recent news from England, concerning the auxiliary plane carried by a bomber has, as usual, proved to be nothing new under the sun. As the picture shows, a small Bristol Scout was launched from the top wing of a Felixstowe flying boat 'way back in the war days. After the flying boat straightened out in flight, the Bristol fighter could be launched with ease but history fails to commit itself upon the re-connection, or, as the navy has it, the "hook-on."

While the lighter-than-air division like to believe that it was the first to propose and adopt auxiliary planes on dirigibles, history once again slaps an idea in the face and shows that the scheme was tried out long ago on airplanes. Another word, echoed back from long ago, states that the small plane was self-sustaining and supported itself by its own propellers, relieving the engines of the boat from the weight of the Bristol. In other words, the boat was not carrying a heavy load at all when the screw of the small ship was revving.

This might prove a worthy successor to the sky-train stunt, it making possible the landing of small airplanes for local traffic instead of the glider train. This scheme has possibilities at any rate.



Here we see the tiny Bristol Fighter perched on the center section of the upper wing of the big flying boat.

Plane Food is Not Plain Food

by JANE H. MEYERS

This is the story of a man who specializes in the gentle art of providing air-travelers with their meals. We may be wrong, but it is our belief that this is one of the newest branches of the aviation industry.

"SO you're traveling by air, and you'll be on board at meal time? Will you get anything to eat?"

The seasoned air traveler, at this point, usually feels very superior. "Will I? Say, on the last trip I made"—and the novice sits back impressed by the gastronomic marvels that he hears appearing magically at 5,000-7,000, 10,000 feet above the earth.

The headquarters where all the food is prepared for the leading airlines coming into Chicago is the Clearing Hotel, situated a block from the Municipal Airport. It is unique in that no sign of any kind advertises the fact. Mr. Perrigo, who heads this unusual business, maintains one of the most spotless kitchens I have ever seen; it would put most housewives to shame. The walls are washed once a day and the floor no less than four times a day.

This is Miss Margaret Burcham, a charming hostess of the American Air Lines, holding a tray filled with Mr. Perrigo's tempting viands. "Dinner is ready in the dining-car" or words to that effect.

Mr. Perrigo plans all the menus and caters exclusively to the airlines. Asked if any hard and fast rules governed the selection of food for travelers of the skyways Mr. Perrigo said, "There is one definite consideration; the food must be simple to guard against air-sickness,—nothing that is hard to digest is served."

I was in the kitchens watching the preparation of tempting viands that would never be eaten on terra-firma. It was the early part of the afternoon and Mr. Perrigo was busily supervising his staff to see that each airline's specialty was properly cooked. It is one of the caterer's most important jobs to see that the piece de resistance of one line is never confused with that of another.

On one of the spotless white pine tables were laid paper plates covered by a dainty paper lace doilie. Generous servings of the best quality corned beef, meat loaf, Dewey ham (which is a delicious combination of boned pork chop and ham pressed into a loaf, cold calves tongue and a deviled egg) were appetizingly arranged on each individual service.

A crisp combination salad in a decorative waxed paper container accompanied the meat, and this particular airline has a choice of seven other varieties of salad that can be substituted and thirteen different meat combinations, so that a constant user of this line knows that he will never have monotony in his menus. Buttered homemade nut bread, parker house rolls, two kinds of olives, celery hearts and a dessert of fresh fruit salad and freshly baked cookies, after dinner mints, nuts, coffee, tea or hot chocolate round out an ample repast.

All the food is sanitarily covered, individually wrapped in paper containers and tucked into the compact dinner boxes. Into the box also go the necessary paper forks, spoons, and paper napkins; a cup for coffee, individually wrapper sugar, stamped with the name of the airline and a picture of the plane, salt, a tiny container for cream —all fit snugly into each person's box.

"This is what I'm giving one of the other lines tonight. Each line's menu is completely changed every day," said Mr. Perrigo. We walked over to watch a white capped chef dexterously browning delicious looking half fried spring chicken. "We have our own method of preparing these fowl. First they are delicately browned to just the right color. Then we remove them from the pan, and put them in a pressure cooker. When they're removed to be individually wrapped they are so tender that the meat almost drops from the bones."

Vegetable salad, rolls, olives, celery, nuts, a fresh fruit cup and cookies rounded out this dinner. I sniffed the tantalizing aroma of the cooking chicken, and envied the lucky travelers opening their boxes high in the air, peering into interesting looking containers, unwrapping odd shaped packages and suddenly coming across the fried chicken,—an aerial picnic deluxe.

I was informed that special individual containers had been ordered to serve chicken a la king, chops, hot beef or lamb stews, in fact a traveler flying at meal time can soon expect to find anything in the higher altitudes that he could order at the leading restaurants and hotels. This summer, if you are lucky enough to travel by air, ice-cream and ices will make a trip on a hot summer's day more pleasant when the thermometer hits a new high. Individual pies, cakes and puddings will add variety.

Special menus are always planned on holidays. If you should find yourself 6,000 feet in the air, traveling at a rate of 200 miles an hour on Thanksgiving, for instance, you need not worry at the thought of missing the traditional turkey with all the trimmings. It will be served to you, along with appropriate favors, and all the individually wrapped accompaniments will doubtless be sealed with paper turkeys, or something symbolical of the season.

Christmas time usually finds goose and plum pudding tucked in the dinner box, and Easter lamb or chicken, with gaily colored Easter eggs as a surprise. In fact, eating in the air has become so popular that people who use flying as a means of getting from one point to another try and arrange their trips so that they will be en route at meal time. It adds zest and fun to a flight.

On the top of the Clearing Hotel is a short-wave radio by means of which Mr. Perrigo keeps in constant touch with the ships and pilots. The radio has opened up an entirely new service to air travelers. This is a typical example: A ship was due in Chicago at 2:30 in the morning, and a baby was among the passengers, a very young baby, who was on a scheduled formula feeding. The mother was naturally concerned about her baby's food; it had to be just the right temperature and the proper grade. The stewardess on the ship learned of the mother's worry

and she communicated the situation to the pilots. The men immediately called Mr. Perrigo by radio. They told him their position, how soon they would arrive at the airport, the name of the passenger, the temperature the milk had to be, the grade, and the time to the minute when they would land and the milk could be served.

Mr. Perrigo has a taxi service arranged with one of Chicago's leading dairies for just such emergencies. He immediately telephoned the dairy and gave them the information. When the ship landed at 2:30 in the morning the baby's milk was waiting, warmed to just the right temperature and waiting to be consumed by the hungry infant.

The age of miracles has arrived, not so much because of the combined assistance of radio and the airplane but mostly because of a quick dinner service to the hungry that has been man's ambition for ages. Mr. Perrigo is therefore to be congratulated on the achievement of what has hitherto been believed as impossible. We surely move fast these days—even in the kitchen.

Modern economic leaders often find it necessary to charter a huge airliner instead of the usual private car. In an event of that kind if they are flying towards Chicago they might desire some appetizing specialties to be prepared for them. The pilot calls Mr. Perrigo by radio and tells him the wants of his passengers. Sometimes they know exactly what they want, but often the message comes in, "I have Mr. Blank aboard in a ship he's engaged especially for this trip. He has eight other men with him, and they want steak dinners for the party to be ready to be put aboard when we land. We're due in Chicago in an hour and a half. Can you fix us up?"

No matter what the order, the answer is invariably "Yes." Recently a famous American princess was a passenger on an airliner and she was tranferring from one plane to another in Chicago. She had the pilot radio ahead for a complete chicken dinner to be ready for her when she landed. When a member of one of Chicago's leading merchant families was married recently, he chartered a huge transport plane to entertain the wedding party on. Mr. Perrigo prepared a beautiful wedding cake for the supper, and the necessary menu to accompany champagne.

During the Chicago World's Fair, the officials of a leading airline telephoned Mr. Perrigo with this rush order: "We've invited Balbo and the 225 men who flew with him to a dinner in our hangars at the airport. They will be there in two and a half hours. Can you have the best Italian dinner you know how to prepare ready in that time?" The dinner was ready, and what a dinner it was. Special antipasto, delicious seafoods, imported wines, there was not a detail that was overlooked.

On your next aerial trip make it a point to dine aloft. It is an experience and a treat you will never forget.

END.

This Should Keep the Pilot Busy

This imposing array of instruments must be read and checked at frequent intervals during flight. The board tells the experienced eye just what is happening with the plane and engine.

HARDLY a place for a blind flyer, however, is this pilot's cockpit in one of the 14 Douglas transport planes now being shipped abroad for service on the Royal Dutch Air Lines.

In addition to navigation aids, the array of modern instruments electrically indicates engine speeds, oil, carburetor and cylinder temperatures, and other data, providing a continual check on engine performance. The Weston Electrical Instrument Co., to whom we are indebted for this photo have provided many of the individual instruments shown here.

As more and more new gadgets continue to be added to the plane for its better performance and control, with each new gadget being represented by one or more dials on the instrument board, we're starting to wonder whether or not this will lead to a third personality in the pilot's compartment—an "Instrument Scanner" whose whole object in life is to read dials and interpret the readings.

Using Tractors on New Airport Projects

TRACTORS have proved to be a boon to airport contractors. The picture below shows a huge Diesel tractor and a twelve cubic yard carryall scraper grading the site of what will be the government's new airport near Chico, Calif. To do this work with horses would entail great expense.

Although this is very heavy work, the Diesel takes the load in second gear and burns only 4.5 gallons of low cost fuel oil per hour. Mr. J. F. Collins, the contractor, owns two caterpillar type Diesel tractors. It will not be long until the planes will be landing on this field.

A tractor makes quick work of a grading job on an airport, simplifying and cutting the costs of the work.

The Hump of the Sopwith Camel

by ROBERT J. FENCL

Who, among our warplane fans has not heard of this most cussed and discussed plane in the British service—the Sopwith Camel? Well, here is a fine collection of data on this famous warbird which, by the way, is shown on the front cover in colors.

SOPWITH CAMEL! What a train of thought the name brings. A tricky killer, hard to handle, quick to spin and the slowest plane on the front in the last year of the war. So runs the list of abuses conjured up by imaginative writers, but a flashback through her history tells a different story.

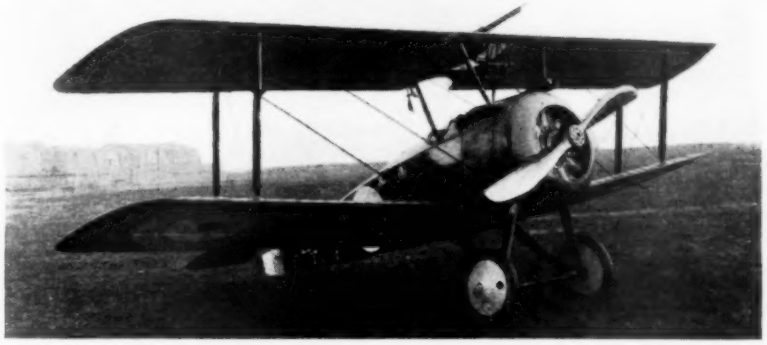
The original design type, numbered 1F1, passed approval by the engineering department of the Sopwith Aviation Company on December 22, 1916. Had the British air forces been equipped with Camels immediately they would have ruled the skies and "Bloody April" would have been averted. The first squadron completely equipped with Camels, the Royal Naval Air Service 6th, landed in France on June 6, 1917. Her dimensions were as follows:

THE SOPWITH CAMEL

Length, 18′ 9″.
Wing Span, 28′ (both wings).
Chord, 4′ 6″ (both wings).
Wing Area Top, 125 sq. ft.
Wing Area Bottom, 115 sq. ft.
Incidence, 2° (both wings).
Gap, 5′ at root, 4′ at tip.
Stagger, 1′ 6″.
Dihedral Top Wing, 0°.
Dihedral Bottom Wing, 5°.
Area Ailerons, 36 sq. ft.
Area Stabilizer, 14 sq. ft.
Area Elevator, 10.5 sq. ft.
Area Fin, 3 sq. ft.
Area Rudder, 4.9 sq. ft.

The most distinguishing feature of the 1F1 was the hump forward of the cockpit in which the twin guns were mounted. This projection gave rise to the "Camel" nickname which later became official. The practice of mounting two guns on a British single-seater was tried first on the Camel and was met with marked success.

The Camel type 1F1 was constructed so as to mount any one of a variety of rotary motors including the Clerget 130 h.p., Le Rhone 110 h.p. and the Gnomes of 100 and 150 h.p. The most consistently high performance was attained with the Le Rhone but, owing to their scarcity, the Clerget was usually mounted. With the Le Rhone, a speed of 118.5 m.p.h. and 111 m.p.h. was reached at 10,000 feet and 15,000 feet respectively. With the Clerget 113 m.p.h. at 10,000 feet and 106.5 m.p.h. at 15,000 were reached.



Three-quarters front view of the Sopwith Camel equipped with a Clerget rotary-cylinder engine. Gun mounted on top wing.

The landing speed was thirty-five miles per hour. She landed and flew easily with the motor off, making her an ideal night pursuit ship. Under 12,000 feet she could turn shorter than any plane built of equal or greater power. Her climb beneath 10,000 feet was spectacular, reaching this height in 10.6 minutes when mounting the Clerget and only 9.2 minutes when equipped with the Le Rhone.

With all these good points, there were bad ones to offset them. At the time of her completion she was as speedy as any Hun plane and superior in climb and maneuverability. As the war progressed dog-fighting took place at higher altitudes than that for which the Camel had been designed, and she was outclassed in power and speed. In spite of this handicap, she was retained as a service type because of her stunting ability.

This gave the Camel a bad name with the later day pilots. Owing to torque, she turned quickly to the right, but the turn had to be executed with a shallow timid bank because she spun with equal facility. Like other rotary-engined planes, she showed a tendency to flutter in violent maneuvers and dives, consequently, she was not a steady gun platform. Another difficult control feature attendant to the rotary engine was the knack of using the throttle without making the motor balk.

As the 1F1 Camel completed its first year of service, a second Camel model was designed. Designated as the 2F1, it was stressed to carry a more powerful motor to better keep pace with contemporary fighters and to evolve a single-seater fighter for use with the Naval forces.

To fulfill this latter end she was designed with a fuselage which was detachable at the rear of the cockpit, facilitating stowage aboard ship.

The method of launching the 2F1 from water was unique. The plane was placed on a barge, which in turn was towed by a destroyer. In launching the plane, the destroyer steamed into the wind at full speed, the Camel taking off with a possible run of only forty feet.

One Zeppelin, the Naval L.53, was

(*Concluded on page* 120)

A Sopwith Camel. See that hump and the partition line aft of the cockpit? There is plenty of dihedral in the lower wing that sometimes caused grief.

Movies on the Airlines

TALKING pictures for the entertainment of passengers on night flights has lately been receiving consideration by several of the large airlines. It is believed that such a feature would be a definite attraction to passengers. It would break the monotony of flying after dark and tend to make such trips more enjoyable.

The chief obstacle to the project, it was believed, was possible interference from the roar of the engines. When the idea was first proposed as a stunt, it was planned to climb to 12,000 feet, shut off the engines, and while the plane glided down at minimum flying speed, one or two reels could be shown. It was actually found, however, that so perfectly are the modern transports insulated against sound that engine noise did not interfere. A complete motion picture could be shown during flight with the engines wide open.

Central Airlines, operating between Washington, D. C., and Pittsburgh, Pennsylvania, recently demonstrated the plan before a group of notables, including Eugene L. Vidal, Director of Air Commerce; General Douglas C. McDougal, United States Marine Corps; Stephen A. Cisler, General Superintendent of Railway and Airmail Services, Post Office Department; and Senator Guffey of Pennsylvania.

The picture, appropriately enough, was "Devil Dogs of the Air." The regularly scheduled plane leaving Washington Airport at 5:35 p. m. was equipped with a screen and megaphone located forward near the pilot's compartment, while the projection apparatus was in the rear of the cabin.

As soon as the plane had left the ground, the show began. So successful was it, that such shows may become a regular feature.

Nor are they limited to night flights. It was pointed out that there is no reason why cabins cannot be darkened and pictures shown during daylight hours. The equipment required adds but little weight and does not cut down the payload of the plane in which it is installed.

Whether or not movies for passenger planes become an established custom on the airlines, it is at least a progressive idea and one that deserves the attention it is being given.

New Catalogue of Interest to Students

WE have just received the new catalogue issued by the Curtiss-Wright Technical Institute, Grand Central Air Terminal, Los Angeles, Calif., which we wish to call to the attention of our readers who are contemplating a course in aeronautic engineering or drafting.

This is a very comprehensive book on the opportunities open to technical men in the aviation industry in which the subject is well presented and highly interesting. It is easy to understand why 10,000 of these catalogues have already been distributed among intending students.

Announcing the New Arup

Front elevation of the new Arup all-wing plane. The new ship is now equipped with a 70 h.p. LeBlond engine instead of the former Continental A-40.

AS the accompanying photographs show, the Arup Flying Wing, invented by Dr. Snyder, South Bend, Ind., has undergone several important changes. This new edition is the result of experiments that have been in progress for some time and materially improve the performance of the plane.

The data given here was kindly submitted by Raoul Hoffman, engineer of the Arup company, who has specialized on the design of this type of plane and who has a number to his credit. He designed the first Arup which wakened this country to the possibilities lying in the "all-wing" type of plane. The first Arup was powered with a Continental A-40, 40-horsepower engine, and even with this small available power, the little ship flew quite well. It is now powered with a 70-horsepower LeBlond engine or with approximately twice the power of the first Arup.

SPECIFICATIONS OF THE MODEL 104 ARUP

Wing span	22′-0″
Length overall	18′-6″
Wing area	273 sq. ft.
Aspect ratio	1: 1.78
Make of engine	LeBlond
Engine output	70 h.p.
Weight empty	650 lbs.
Total weight	1,200 lbs.
Fuel capacity	18 gals.
Wing loading	4.4 lbs./sq. ft.
Power loading	17.2 lbs./h.p.

EXPECTED PERFORMANCE

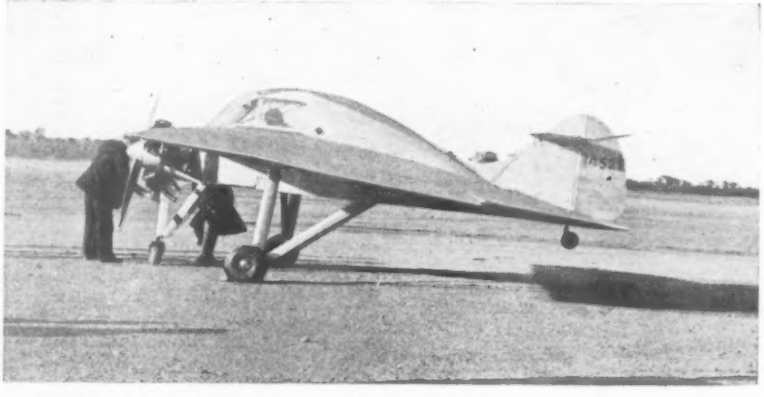
Top speed	110-115 m.p.h.
Landing speed	28- 32 m.p.h.
Climb in first minute	580 ft.
Take-off distance	200 ft.
Ceiling	9,000 ft.

The above calculations for weight and performance are based upon the following distribution of the live road, which is normal for this type of ship.

LIVE LOAD ASSUMPTION

Pilot	175 lbs.
Passenger	175 lbs.
18-gals. gasoline	115 lbs.
3-gals. lube oil	21 lbs.
2 parachutes	24 lbs.
Baggage	40 lbs.
Total live load	550 lbs.

It will be noted that a change has been made in the cabin that gives the pilot better visibility than before and that the cabin possesses a smoother and probably, a better streamline form. Similar alterations have made it easier to enter the compartment which was formerly entered through a trap-door in the bottom of the cabin.



Side elevation of the new Arup showing the alterations that have been made in the fuselage, cabin and tail-group.

The Bi-Motored Sikorsky S-43

Notes on the latest mammoth Sikorsky amphibion, the first of two ships to be delivered to Hawaii where they will be used for inter-island passenger and mail service. This is believed to be the largest amphibion of this type yet constructed.

PILOTED by Captain Boris Sergievsky, chief test pilot of the Sikorsky Aircraft Corporation, the initial flight of the new Hornet powered Sikorsky S-43 took place on June 5 over Long Island Sound adjacent to the Sikorsky Factory, Bridgeport, Connecticut.

This is the first of two ships to be delivered to the Inter-Island Airways of Hawaii, where they will be used for inter-island passenger and mail transportation. The majority of airline operators throughout the world are showing a keen interest in the performance of the S-43 as adaptable to their particular lines, including the famous Pan American Airways System which has already entered an order for six of these ships.

The S-43 is a 16 to 25 passenger, high wing, cabin monoplane amphibion powered by two Pratt & Whitney S1EG geared Hornet engines, delivering 750 h.p. each at 7,000 feet altitude to two Hamilton Standard constant speed propellers. The structural features of this airplane are based on the development of its famous predecessor, the Sikorsky S-42. One of the most outstanding features of the new S-43 is, that while an amphibion, it makes no concessions in performance or efficiency to any other transport aircraft.

The airfoil is of the NACA series 22, tapering in plan and form from the center section to the tips. The 86 foot semi-cantilever wing is constructed in three panels (i.e., center section and two wing tips), utilizing a single box type spar having numerous continuous extruded angles and a flush type riveted skin covering. The wing is fabric covered rear of the spar. The ribs are constructed of duralumin. A flap of duralumin construction, fabric covered, extends along the trailing edge of the wing between the ailerons and is mechanically operated by hydraulic pistons to any desired angle to permit slow landing speeds or short take-off runs.

The Sikorsky S-43 amphibion taxying. Note the landing wheel position which folds up along the hull. It takes off with one engine.

The statically balanced ailerons are also of duralumin and may be dropped 10° when landing, furnishing additional flap area. The S-43 is assured of smooth riding characteristics in the roughest weather because of its high wing loading of 24.34 pounds per square foot. The low power loading of 12.67 pounds per h.p. will make possible a short take-off and a higher rate of climb resulting in a great margin of safety. The fairing between the wing and the hull is non-structural and, like the entire leading edge, is removable for access to engine control cables.

The two Pratt & Whitney Hornet engines are installed in the leading edge of the wing and are mounted on vibration dampened welded steel tubing, which eliminates the chance of motor vibration in the passenger compartment of the sound proofed hull.

The 50 foot hull is of all-metal, semi-monocoque construction with members and platings protected against corrosion by the anodic process. An important feature of the hull is that open sections are used throughout to assure immediate detection of corrosion and to facilitate maintenance and inspection. Flush type rivets connect the internal longitudinals to the deck bottom platings and transverse frames.

Four main bulkheads with watertight doors divide the hull into five separate compartments, any three of which will float the airplane. The landing gear retracts in 12 seconds into a watertight compartment in the hull which occupies a relatively small part of the interior. Streamline tires are used and fair completely into the hull when the landing gear is retracted.

The tail surfaces are of fabric covered duralumin structure and are externally braced. The stabilizer is adjustable. The elevators are dynamically balanced by means of automatic trailing edge servo tabs.

Igor Sikorsky (Right) wishing the pilot, Capt. Boris Sergievsky, good luck just before the first test flight.

DIMENSIONS, AREAS AND PERFORMANCE DATA OF THE S-43

DIMENSIONAL DATA

Span	86 ft.
Height	17 ft. 8 in.

Length Overall	51 ft. 2 in.
Length of Hull	50 ft. 3 in.
Beam of Hull, maximum	90 in.
Height of hull, inside, minimum	72 in.
Total submerged displacement, approx.	50 tons
Tread of Wheels	11 ft. 2 in.
Size of Wheels, streamline	45 in.
Size of Tail Wheel	18 in.
Chord, maximum	11 ft. 6 in.
Dihedral	2°
Span of Tail Planes	22 ft. 6 in.
Diameter of Propellers	11 ft. 6 in.

AREAS

Total Wing Area	780 sq. ft.
Total Horizontal Tail Area	127.6 sq. ft.
Total Vertical Tail Area	61.75 sq. ft.

ESTIMATED PERFORMANCE

Gross Weight	19,000 lbs.
Weight Empty	11,380 lbs.
Weight Useful Load	7,620 lbs.
Power Loading (per B.H.P.)	12.67 lbs.
Wing Loading	24.34 lbs. sq. ft.
Cruising Speed, Sea Level 75% B.H.P.	167 mph.
Cruising Speed, 1,000 ft. 70% B.H.P.	165 mph.
Cruising Speed, 8,000 ft. 75% B.H.P.	181 mph.
High Speed, Sea Level	186 mph.
High Speed, 7,000 ft.	200 mph.
Stalling Speed, Sea Level	65 mph.
High Speed, One Engine 7,000 ft.	125 mph.
Initial Rate of Climb, ft. per min.	1,250 ft.

It would seem that these amphibions open new possibilities for the many small islands in the Pacific where the distances are great, but where frequent intercommunication is necessary. Necessity for quick communication between tropical islands led to the rapid development of radio and it will probably be the same with aviation. If it were not for the situation of the United Fruit Company in this respect we would have no radio today.

Capt. Boris Sergievsky at the controls of the Sikorsky S-43.

The Aero-Sportswoman

by JOAN THOMAS

These girls are contributing their share toward the success of the stratospheric flight, by cementing the seams of the envelope.

THE Women's National Aeronautical Association held its biennial national meeting and election at Dayton, Ohio, May seventeenth and eighteenth.

The program arranged by Mrs. George Shaw Green, national president, Mrs. Margaret Jacobs Heron, national secretary, and Miss Martha Smith, president of the Dayton unit, gave the visiting delegates and members a feast of aeronautical wonders and beautiful hospitality.

On Friday, the seventeenth, the association was entertained at Wright Field. General Robins, the commandant, acted as host, making a delightful speech of welcome at the luncheon and later ordered a special demonstration flight of the various types of planes for the visitors. Everything from enormous transports and bombers to the speedy little pursuit ships were put through their paces.

It was a dazzling display of virtuoso pilotage. As one new fighting plane roared across the field and pulled straight up, it executed a series of snap rolls in the vertical climb. One of the delegates, who is also a pilot with a good deal of experience, turned to the general and remarked, "I never saw that done before." "No," he replied, "nor has anyone else!"

The visitors were conducted through the various experimental and testing laboratories where the processes were explained and demonstrated. As the tour of inspection progressed, they could only feel wonder and admiration for the qualities of mankind which made such achievements possible.

From Wright Field the company moved on to the wide lawns and terraces and spacious hospitality of Mrs. George Shaw Green's lovely estate for tea and a few moments' rest. In the evening they were entertained at a banquet at the Dayton Country Club, where they had the rare privilege of hearing Major Keppner tell his fascinating personal account of the ill-fated stratosphere flight last year. Captain Stevens and Captain Andrews gave an interesting description of the plans for the new attempt that will be made this summer.

On Saturday morning the organization held their official business meeting. It was the unanimous opinion and desire of all the delegates that Mrs. Green and Mrs. Heron should be re-elected to the national offices which they have held so efficiently for the last two years, but they declined for business reasons. Mrs. Green not only has a family to consider, but full responsibility of a large business organization as well.

Mrs. Heron is head of the publicity department at Wright Field. It is an exacting position that requires a high degree of skill as a writer as well as a broad technical knowledge of the whole field of aeronautical research.

The W. N. A. A. regrets its loss, but feels that the new officers who were elected are able successors and will carry on the same high standards and excellent work of the organization. The new officers are as follows:

President, Mrs. Carlos Reavis, Denver, Colo.; first vice-president, Mrs. Schuyler B. Terry, Chicago, Ill.; second vice-president, Mrs. Barbara Collier, Tulsa, Okla.; secretary, Mrs. Larry Neff, Denver, Colo.; treasurer, Mrs. James Brazell, Oklahoma City, Okla.; governor-at-large, Mrs. George Shaw Green, Dayton, O. The national directors are Miss Martha Smith, Dayton, O.; Mrs. Walter Patterson, Charlotte, N. C.; Mrs. Ulysses Grant McQueen, Beverly Hills, Cal.; Mrs. H. G. Boomstra, Salt Lake City, Utah, and Mrs. E. P. Caner, Miami, Fla.

Mrs. Reavis, the newly elected national president of the W. N. A. A., has been president of the Denver unit, which is the largest and one of the most active chapters in the country. Therefore, with a good association background and an intense and sincere interest in all phases of aviation, we are sure the organization has been most fortunate in its choice of a leader for the coming year.

In the afternoon, after the business session had been completed, the delegates were conducted out through the lovely hills and dales section of the

(*Concluded on page* 129)

Jim Collins—Ace of High-Divers

by LIEUT. H. LATANE LEWIS II

The dramatic story of an army test pilot and member of the "suicide squad" that took one too many chances in power diving a bomber.

DIVING Uncle Sam's new fighting planes to find out whether or not they will hold together is a job nobody wants. Not many pilots will do it for love or money.

However, there is a little group of free-lance flyers—a group which probably doesn't number more than half a dozen—who specialize in this dangerous work. They are dubbed the "Suicide Club" by their brother airmen.

When a new experimental fighting plane emerges from the factory workshops, glistening in her pristine glory, the regular factory test pilots are frequently not called upon to give her that first long dive. Her wings may be shorn off like cardboard, or the tail may give way, or she may be just bull-headed and refuse to pull up.

There are a lot of things that can go wrong and there isn't much chance of bailing out with a 400-mile-an-hour razor-edge of air howling past the cockpit. So the manufacturers, rather than risk the necks of their own staff pilots, call in a member of the Suicide Club.

Outstanding among them was Jim Collins. He had dived more airplanes —and had dived them faster and farther—than any other pilot. Last month, one of them carried him to his grave with the wind screaming a shrill symphony of death. Jim had been living on borrowed time for a good many years. More than once he had pulled the whiskers of death and had come off unscathed, to grin and go back and do it again.

One bleak December afternoon, six years ago, he walked out on the line at the Naval Air Station at Washington, D. C., where an experimental dive-bomber was waiting for him. Navy officials who were to witness the demonstration demanded an 8,000-foot power-dive. Jim merely shrugged, had his parachute repacked and tightened his safety belt. He climbed up to 12,000 feet. Here he rolled her over on her side, kicked bottom rudder and let the nose flip straight towards the postage stamp that was the flying field.

Down, down the plane rushed. Straight ahead over the nose he could see the brown earth leaping at him. He was standing on the rudder pedals, head ducked forward under the windscreen to protect his face from the typhoon of air.

He was down to 5,000 feet when suddenly there was a noise like a loud explosion. The plane lurched violently and Jim felt something strike him a stunning blow on the head. He lost

Lieut. James H. Collins. This photograph was taken before he resigned from the army.

consciousness for a moment and then, as he came to and realized his predicament, he began to struggle to get clear. The plane, shorn of wings on the right side, had gone into a violent spin and was falling at a speed that would make the proverbial plummet look like a snail. The centrifugal force pressed Collins down into the cockpit and for 3,000 feet he fought desperately to get out.

Finally, he managed to leap clear and immediately began feeling for the rip-cord ring. As he was about to pull it, he realized that he was falling directly in line with the path of the wreckage and, if the 'chute opened now, the doomed ship would fall on him. The ground began to loom up close. Just when it seemed too late, the plane swerved off and Jim gave the rip-cord a healthy tug. The 'chute whipped out with such force that Jim was stunned and landed in a groggy condition between the wings and main wreckage of his ship in a little vacant lot.

It was reduced to matchwood and the engine was buried several feet in the frozen ground. Miraculously, the plane had crashed in the only open space for some distance around and was surrounded by houses and buildings.

Jim's only injury was a slight bruise over one eye.

Early this year, Jim had been making some sensational power dives with quick pull-ups in a new Navy bomber-fighter type and had registered some of the highest stress readings ever made in an airplane. When he finished that job, he went to work dive testing another new fighter for the Navy at a factory at Farmingdale, Long Island. The ship was supposed to be the hottest thing that had ever flown. It was the last word in design, engineering and performance.

Long weeks had been spent in working out the design and the stress sheets. Equally great care had been spent in the fabrication of the ship, and the job was as perfect as humanly possible in the preliminary stages, but even then there was a hidden defect.

For three days Jim had been doing those long screaming dives for which he was so famous. Then, just about twilight one evening, as he was finishing his routine for the day, he decided to make one more dive before coming in and landing. It would be the last one required.

A group of Naval observers lined the tarmac in front of the hangars. They saw the little silver ship climb more than two miles above them until it was just a speck in the gathering dusk. The shrill whine of its engine broke the evening stillness as it headed earthward. Faster, faster, it gathered speed. Jim had slammed the throttle wide open. The shriek of the wind increased in a mighty crescendo like a fire siren. He was riding that ship like some wild hell-riding Valkyrie. Suddenly one of the wings crumpled. The plane, like a huge bomb, plummeted towards the ground at over 400 miles an hour.

"Bail out! Bail out!" shouted onlookers excitedly. But no parachute appeared this time. Fate had decreed that this should be Jim's last ride. The plane with the gallant airman still gripping his controls in the cockpit, plunged to earth in Pinelawn Cemetery.

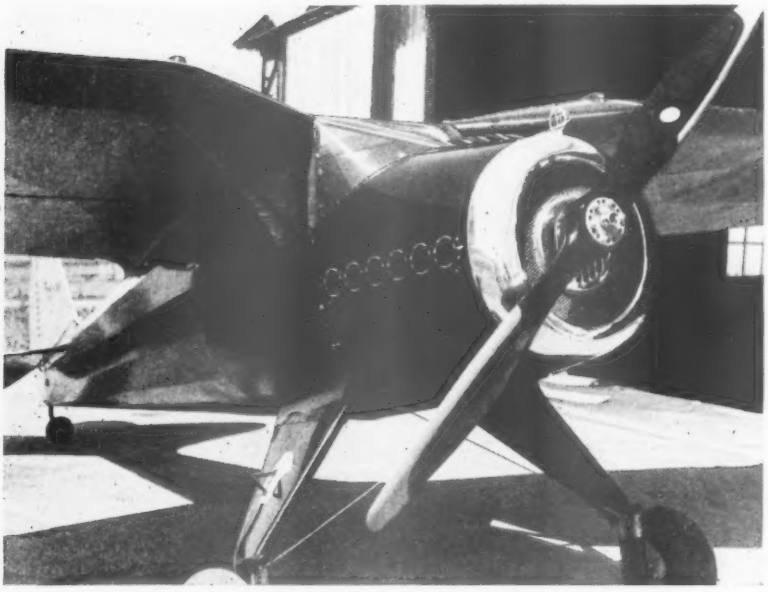
When helpers arrived and had pulled away enough of the wreckage to get to Jim, they found him still alive. A faint flicker of his old grin passed across his lips, as he murmured, "Don't bother to wipe my face. I'm done." His eyelids drooped closed. That was all.

Willing hands tenderly lifted his broken body out of the shattered cockpit and bore it off. A few seconds later the battered wing, which had followed in the wake of the falling plane, came fluttering slowly to earth a short distance away.

END.

XUM

The Plymouth Engine is Now



The front end of the Plymo-Coupe is an exceedingly neat job, well designed and very attractive. The visibility range is beyond the average for this type of ship.

by
EMORY F. SCOTT

ALTHOUGH the argument rages on, as to which type of powerplant will eventually become the most popular in aircraft, it is believed in this corner, that the "in-line," or horizontal motor will rule the roost in the near future.

Without a doubt, this type of powerplant has always been the most efficient where a minimum of air resistance was desired, as in racing-planes. We recognize this answer, of course, in the fact that with the two motors of equal horsepower, the in-line type has only about one-third the frontal area of the radial design.

People are getting more "air conscious" every day. This is the result of two things, namely; reduced danger and lower price. Today the airplane is a comparatively safe means of travel Most of the accidents in private flying are due to lack of flying knowledge rather than faulty plane construction. But there is still a need for a "flivver," or low priced airplane before private flying will become practical.

One of the smoothest jobs of adapting an automobile motor for aircraft use, has been turned out by the Fahlin Company, Marshall, Missouri, for the Bureau of Air Commerce. This Plymo-Coupe uses a Plymouth automobile motor inverted and mounted in rubber.

The propeller is geared to the motor through a hole cut in the center of the radiator. Some of the popular features of this plane include: knee-action landing gear with wheel brakes, tail wheel, standard automobile dash and instruments, mohair upholstered cabin and seats, rolling windows, and a large baggage compartment.

One of the outstanding innovations incorporated in this plane is a combination aileron-flap arrangement. This is said to be quite an improvement over the conventional air brake, or wing flap.

By using approximately one-third of the effective wing area as a flap, and this area being extended the full length of the wing span, a variable-lift wing arrangement is obtained. This combination has been found to give unusual performance at all speeds. Merely by raising or lowering the trailing edge (the flap), perfect control is maintained on a selective glide over a wide range, ranging from a normal flat glide, to a semi-vertical descent.

On the other hand, with the flaps partly down during the take off, the run is shortened as much as twenty-five percent. and permits a considerably steeper climb. In level flight, with a flap setting of two-degrees minus, an increase of about five miles per hour on the top speed is realized. Although the flaps are controlled by a separate lever, when used as flaps, an arrangement is made whereby the stick also controls them for aileron action alone.

The plane has a top speed of 120 miles per hour, cruises near one hundred and lands at 42 miles per hour. It uses approximately four gallons of regular automobile grade gasoline and one-fourth to one pint of oil, per hour.

All of the advantages inherent with an auto-engined plane will be found, of course, in this little ship, whether powered with a Ford, Chevvy or Plymouth engine. The operating cost of the engine and the maintenance, repair, and upkeep of same is the lowest that it is possible to obtain.

It has the new type grain automotive type instrument panel and instruments which are automobile instruments converted for airplane use and which can be bought at an astonishing low figure.

The fact that the Plymouth engine

The left side of the powerplant.

Here is a Plymouth Sedan and its offspring, the flying Plymo-Coupe. Many Plymouth auto parts are used in the plane.

Propelling an Airplane

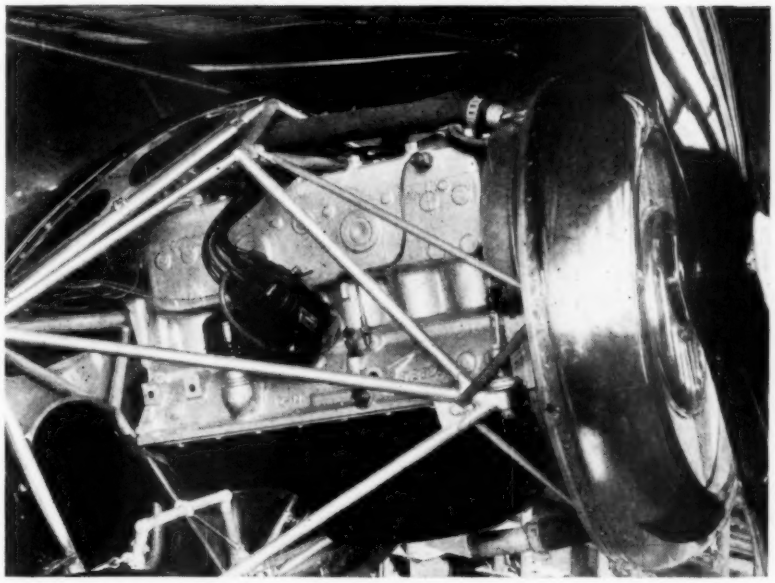
THE PLYMO-COUPE described here, is just one step further in lightplane development. Ford and Chevvy engines have been employed successfully on lightplanes and now comes the Plymo-Coupe equipped with a Plymouth engine. The use of auto engines for aviation means a reduction in the cost of the most expensive item in the plane.

used in this ship is a stock-Plymouth engine, with no changes whatsoever with the exception of the gear reduction that has been added to it to drive the propeller at half crankshaft speed to increase the horsepower of the engine, all the parts of tthe engine are standard and can be purchased at any Chrysler, De Soto, or Dodge dealer in the United States of which I understand there are about 8,000 dealers.

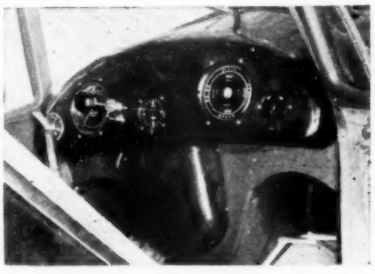
Any average garage mechanic can make the necessary repairs. The engine as installed in this plane is much more successful than it is in the Plymouth motor car. Everything being available without the removal of the engine from the frame, including the cylinder head and lower crankcase panel which can be removed quickly and easily for repairs.

SPECIFICATIONS FOR PLYMOCOUPE

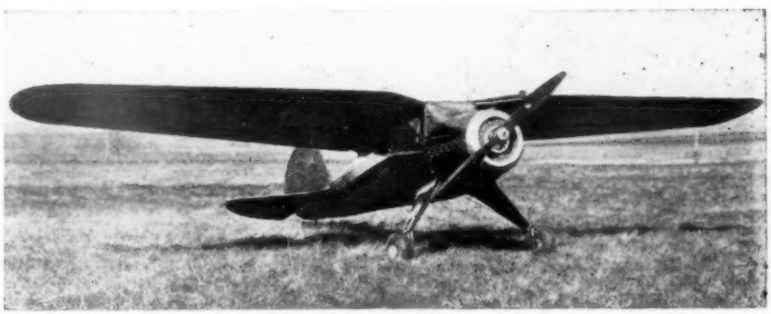
Weight empty	1,075 pounds
Useful load	536 pounds
Gross weight	1,611 pounds
Ceiling (service)	16,000 pounds
Climb, per minute, pilot only	1,000 ft.
Landing, touch to stop	200 ft.
Landing speed	42 m.p.h.
High speed	120 m.p.h.
Cruising speed	104 m.p.h.
Fuel capacity	17 gallons
Oil capacity	6 quarts
Consumption fuel per hour	4 gallons
Endurance at cruising	5 hours
Span	32 feet
Chord	8½ ft. x 4½ ft.
Area	178 square feet
Wing loading	9.04 lbs. per sq. ft.
Power loading	21 pounds
Height	6 ft. 10 in.
Tread	6 feet
Stabilizer and elevator area	24.8 sq. ft.
Rudder and fin area	10.5 sq. ft.
Diahedral, wing tips only	1½ degrees
Length	17 ft. 9 in.



Right side of the Plymo-Coupe power plant showing that all of the leading characteristics of the Plymouth automobile engine have been retained. You can get repair parts from any Plymouth dealer.



Even the instrument board is abstracted from a Plymouth car.



The Plymo-Coupe is a clean looking job and, in spite of the water-cooled engine, has the frontal aspect of an air-cooler. Note, particularly, the clean landing gear.

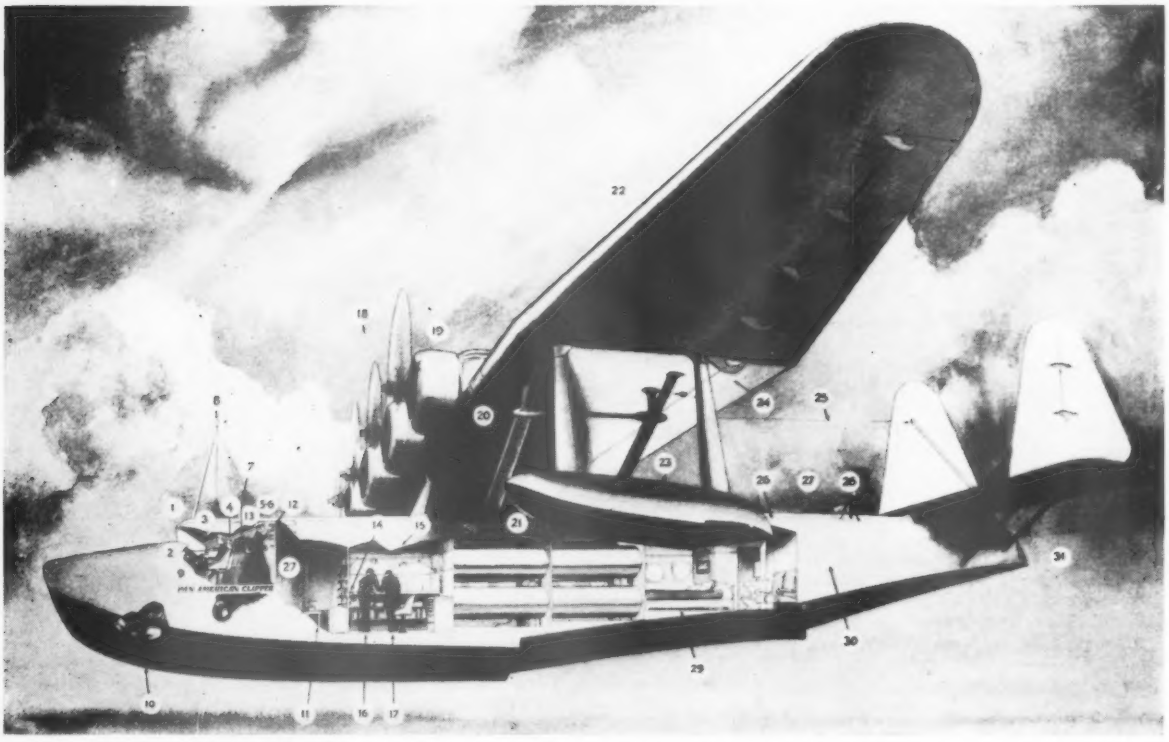
Lightplane fans should rejoice over the fact that the Bureau of Air Commerce is awakening to the fact that an automobile engine is a dependable and suitable source of power for lightplanes. There have been many very successful applications of Ford motors in the past by Pietenpol, Corben and others and it is just possible that the auto engine will become the ultimate lightplane engine both for amateur and commercial production.

Owing to the higher road speeds now becoming more and more common with automobiles, the automobile engines have grown consistently smaller and more powerful during the past few years. Fifteen or twenty years ago, it was almost impossible to find an automobile engine suitable for driving an airplane.

Compression ratios have become higher, year by year, with correspondingly greater volumetric output and efficiency. The efforts of the gasoline refiners have made such ratios possible with their modern high octane fuels. To the gasoline refiners, more than to anyone else, is due the credit of the modern compact high-compression engine, for without high octane gasolines it would be impossible to achieve a horsepower on three cubic inches of displacement.

Whether a four-cylinder, six-cylinder or eight-cylinder engine will be the ultimate in automobile construction is merely a guess, but it is my guess that the six is a permanent fixture, combining as it does, the maximum of smooth running with a high efficiency and low fuel consumption.

A Phantom View of the Huge Clipper Ship



The first of the American trans-oceanic flying boats, the Clipper Ship of the Pan American Airways that flew the experimental flights to the Hawaiian Islands and return. The diagram shows: (1) The bridge with four members of the crew. (2) First officer pilot. (3) Master throttle. (4) Second officer pilot. (5) (6) Radio and engineer officers. (7) Two-way radio communication and direction finding apparatus. (8) Radio direction finding mast and antenna. (9) Instruments for flight only. (10) Anchor compartment and forward hold. (11) Galley and store-room for auxiliary gear. (12) Engine, fuel and auxiliary instruments. (13) Forward navigation hatch. (14) Master compass. (15) Chart-room. (16) Navigation officer. (17) Commander. (18) Propellers. (19) Radial air-cooled 700 h.p. engines, total horsepower 2,800. (20) Folding servicing platform folds into entering edge of wing. (21) Central fuel compartments. (22) Wing. (23) Outboard pontoon. (24) Wing flap brake. (25) Fixed radio communications antenna. (26) Midship navigation hatch. (27) Exit and entrance hatches. (28) Drift sight hatch. (29) Sleeping quarters for three of crew. (30) Aft storage compartment. (31) Total length 68'-8".

THE 19-ton 2,800 horsepower flying boat of the Pan American Airways system, is the first of America's giant trans-oceanic flying boats. It is fitted out as an experimental plane for trial flights from California to the Orient by the way of the Hawaiian and Philippine Islands.

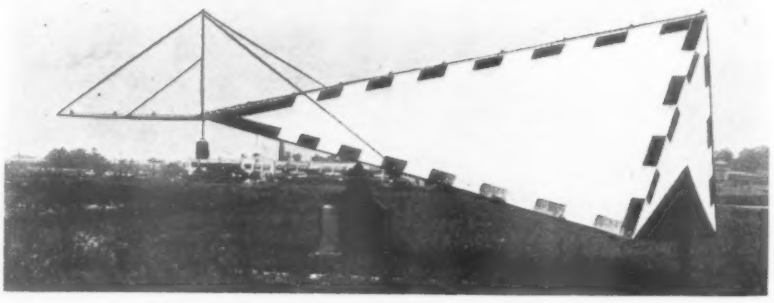
The "Pan American Clipper Ship" is a sister-ship of the "Brazilian Clipper" which now holds all seaplane records for efficiency as a passenger carrying transport ship. It has a normal range, as equipped at present of 3,000 miles at a speed of 150 m.p.h., a distance that is 600 miles greater than the longest over-water stretch on a Pacific crossing. The distance from California to Hawaii is 2,400 miles, this giving the ship plenty of leeway in case of storms or other adverse conditions.

It will be noted that the enormous gasoline tanks (21) are located below the center of pressure of the wing in such a way that filling or exhausting the tanks in flight will not cause unbalance nor disturb the trim of the ship. It is completely equipped with two-way radio communication and with a radio beam direction finder that was tried out with such success on the last trip.

The Army Air Corps Wind Indicator

DEVELOPED by Army Air Corps engineers at Wright Field within recent months, details of a new type wind direction indicator for use at all Army Air Corps fields have been announced.

The indicator consists of a three-sided figure, each side a triangle, delicately balanced on a concrete base. It weighs more than a ton, is 36 feet long and further lengthened by a mast at the apex, which like the horizontal edges is illuminated with green-hooded lights for night guidance. The left side is painted international orange with black blocks at the edges and the right side is white with black blocks.



The wind-indicator in position in airport

Probing Into the Stratosphere

by CHARLES J. BAUER

Much interest has been attached to the projected stratospheric flight that is in charge of the National Geographic Society and the U. S. Army Air Corps. In addition to the author's story is an appendix by the National Geographic Society that gives a detailed description of the data that is to be collected.

AN ARMY truck was driven into Wright Field at Dayton and stopped under an unloading crane. The driver and his crew pulled back the canvas covering, revealing a nine-foot bubble. The crane dipped, its hook took hold and the bubble, half black and half gleaming white, swung free.

And the roundness of it hung a few minutes in the sunlight, as it shall swing for 10 or 12 hours some bright day soon, but then, instead of from a crane, it will hang beneath the belly of the biggest balloon ever made. For in this frail sphere—it is only a quarter inch thick—two or perhaps three men will try to scale a celestial path reaching higher than ever attained by living thing. They hope to go at least 15 miles.

The flight is jointly sponsored by the Army Air Corps and the National Geographic Society. The first similar flight last summer, commanded by Major William E. Kepner, was not a complete success. Like that one, this is to start from a deep natural bowl in the Black Hills of South Dakota, a few miles from Rapid City.

You realize as Capt. Albert W. Stevens, the commander, and Capt. Randolph P. Williams, in charge of ground operations, pose in its shadow for photographers, that important changes have been made to increase chances of success.

Not the least of these changes have been in personnel. Major Kepner is left off the personnel this time. The crew did not function last year as smoothly as it should have. Capt. Stevens, second in command last summer, has been placed in charge. Capt. Orvil Anderson, who was in charge of ground operations, but who went along on the flight, is now second, and Capt. R. P. Williams, for whom this is the first stratosphere experience, is expected to go along in the magnesium alloy bubble. Meanwhile, he is to direct ground work.

The gondola is nine feet in diameter instead of eight. Like the first, it is made of an alloy lighter even than aluminum. In fact it weighs only 638 pounds, but its useful load of instruments, batteries, supplies and men are five times as heavy. About four tons of ballast will be taken along, most of it hung outside—a total weight of nearly six tons. The balloon, ropes and valves weigh nearly another three tons.

The increased size permits considerably more room and, in fact, the six-four, eight-inch floor is large enough to seat eight persons around an ordinary dinner table. Instead of shelves

Capt. Albert W. Stevens (Left), Commander of the National Geographic Society and Capt. Randolph P. Williams.

against the walls, the gondola will dispose of much equipment and all the ballast outside, so that in effect the floating laboratory will be pretty much inside out.

The gondola is built differently in other respects, too. It will be attached to the bag by a ring at its top, instead of by straps running down to a ring at its base. This arrangement will diminish the undisposable load, and this is important, for if the balloon begins to descend too fast, the batteries and other equipment will be jettisoned after most of the ballast is released.

Instead of being jammed in the bubble, sacks—40 of them—will be hung, each with 150 to 200 pounds, outside. Inside each sack, buried in the lead shot ballast, a dynamite cap will be wired to an electrical control inside the gondola. The other gondola, fragments of which are on exhibition in the museum at Wright Field, had two manholes on opposite sides, both above the equator. On the new bubble one manhole is in the white hemisphere above the equator, and the other is diametrically opposite.

Suppose, as in the first flight, the stratonauts are forced to jump? Instead of scrambling for the narrow opening high up in their cell, they can remove the lower hatch cover and simply slip down, almost through the floor. Capt. Stevens, who left the crashing gondola after Capt. Anderson on the first flight, said afterwards that the latter's feet looked "awful big" when he stuck for a few moments in the opening, when bailing out. Only by a narrow margin did the three flyers escape before the balloon crashed in a Nebraska cornfield last summer.

This factor of safety always receives primary attention in preparing for such a venture. In the other, the mammoth parachute rigged in the load ring above the bubble was shattered beyond salvage. It was old to begin with, having been reinforced with thousands of yards of silk tape after several years of idleness following tests in lowering big loads.

As the bag and bubble hurtled to earth, the ropes connecting them were so badly tangled with the torn portion of the bag as to make use of the big parachute impossible. All the cautious preparations for this novel means of safety were for nothing.

But the device is being duplicated. A new parachute is under construction and this one, too, is 80 feet in diameter. It is of new silk, strong enough to buoy up much more weight than the six-ton loaded bubble, above which it will be packed.

Just above it will be installed a razor-edge knife, to cut the bubble loose at any time. As it falls from the bag, a pilot 'chute will open, pulling out the billows of the big one. The knife that may cut the 10 large strands between bag and bubble will be operated by air pressure. At a touch of the pilot's finger, 700 pounds of air will rush to the knife in an emergency.

The inventor of the huge umbrella, Major E. L. Hoffman, unfortunately for the present task has been transferred to the command of a fighting squadron at Brooks Field, Tex. But he will go up from there to Rapid City to supervise details involving the arrangement of the 'chute.

In addition, each of the occupants will wear his own parachute and there will be dozens of smaller ones for floating the cameras, batteries and the like down, if they are jettisoned. You may be sure, though, that Capt. Stevens, the army's ace aerial photographer, will part with the cameras last. The great bag from which the bubble will suspend was shipped from the Goodyear-Zeppelin plant at Akron, just as the gondola was brought from Midland, Mich., to Wright Field. At the field, all preparations for the flight were conducted. If you have ever run a 100-yard dash, or seen one run, you know that it is a fair sprint. Well, if you sprinted around the outside of the bag

you would run farther than 100 yards. Its diameter is 200 feet. This bag, with a capacity 23.3 percent. greater than the other, is to be filled with 3,700,000 cubic feet of helium, at its highest level. This gas is rare and expensive but it will neither explode nor burn, as will hydrogen, with which the other bag was inflated.

The bag is to be fully inflated at the start. A certain amount of helium will be piped into its folds, and it will be puffed out the rest of the way with air. The helium is lighter and will rise to the top. As the balloon rises, the helium will expand and the air will be forced out below, through a 10-foot appendix. Both the lessening pressure of the outside air, and the superheat absorbed by the bag from sunlight will expand the helium.

Four electrically operated thermometers have been installed in the bag, for indicating the temperature inside the bag, to the men in the gondola. To keep the balloon revolving, a 12-foot boom is to be attached horizontally to the gondola, with an electrically operated fan at the end of the boom. This revolving motion will result in even absorption of superheat, and will permit the stratonauts to make varied observations in an evenly heated gondola.

Not a single rope will connect the bag and the gondola. Instead of ropes, parachute webbing has been substituted. This webbing is stronger and will not twist as a rope will.

From a "belly band" around the great bag, about two-thirds to its top, 160 smaller strands of the webbing will stretch down and each two of them will combine with 40 still heavier strands and these with 20 other strands, finally merging into the 10 strands at the load ring.

The oxygen liquifying machine used last year has been left behind at Wright Field, on its truck. The liquid oxygen flasks that will keep the air fresh inside the cell are being shipped from Kansas City.

Three of the scientists who installed equipment in the gondola at Wright Field are G. S. Fassin of the Bosch and Lomb Co., Rochester, N. Y.; Dr. Oscar Steiner of the Bartol Research Foundation of the Franklin Institute, Swarthmore, Pa., and O. H. Gish, assistant director of the department of terrestrial magnetism, Carnegie Institute, Washington, D. C.

A corner of the completely equipped weather-bureau at the stratocamp, near Rapid City. This corps of nine men prepares three maps daily.

Gish installed the connections for the four thermometers and an electrical conductivity recorder. In the air as high as the balloon is expected to go, the electrical conductivity is perhaps 300 times greater than at sea level, Gish explains.

Fassin installed a spectrograph for photographing and analyzing wavelengths of light rays in the stratosphere. Several installations directed by Dr. Steiner concern the mysterious cosmic ray, the nature of which puzzles scientists, although they recognize it as a form of energy abundant in the stratosphere, that may be turned to good use in our everyday lives.

Appendix

by NATIONAL GEOGRAPHIC SOCIETY

THE purpose in sending "Explorer II" into the stratosphere is to add to man's knowledge of the region which lies above the surface of the earth and through which the all-important energy of sunlight and other less known radiations flow in to the earth from outside space. A very large balloon is used because in no other way can the heavy instruments, which must be depended upon, be lifted high above sea-level. Among the specific projects to be conducted are:

Temperature and barometric pressure changes. These measurements will be made from the earth to the highest point to be reached by the balloon. Only a few such measurements have been made continuously to high altitudes.

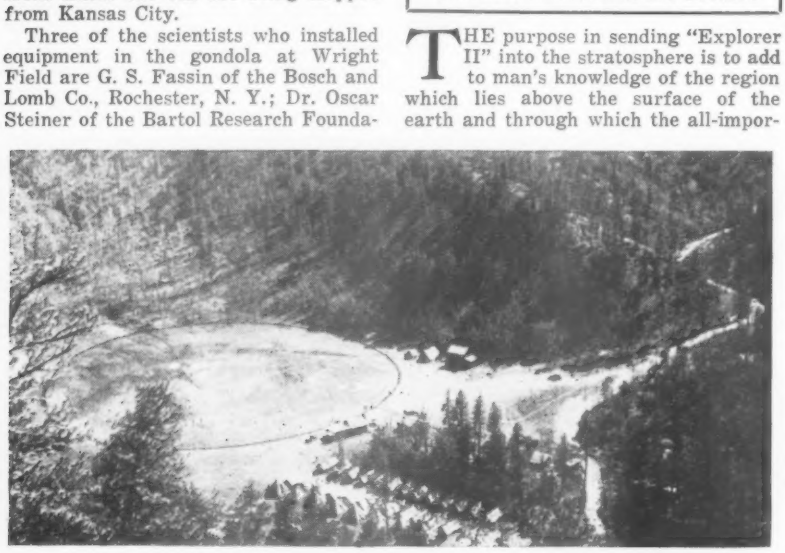
Samples of Stratosphere Air. Spherical flasks with capacities of nearly six gallons each, will have all air pumped from them before the flight. At the highest altitude reached, stratosphere air will be allowed to flow into the flasks, which will then be sealed. The samples will be brought to earth and analyzed.

Cosmic Ray Studies. Relatively few The data obtained at the "ceiling" of tudes where cosmic ray studies can best be made. Although the existence of the radiation, which has since come to be called "cosmic radiation," has been known for more than 30 years, there are still many facts about the nature and behavior of the rays which scientists are eager to learn.

Spectrographic Studies. Light studies, like cosmic ray studies, can best be carried on in the rare upper atmosphere. The data obtained at the "ceiling" of the flight will give indication of atmospheric conditions above the regions which man can hope to reach. One of the most important groups of phenomena that can be studied through the spectrographs to be taken into the stratosphere concerns ozone and its distribution.

Ozone absorbs ultra-short rays of light (the shorter rays in the ultra-violet portion of the spectrum). Thus, ozone protects the earth from certain rays that are believed to be harmful to life. It is both interesting and impor-

(*Concluded on page* 132)



Looking into the stratosphere bowl, in the Black Hills, near Rapid City, S. Dak. This is a natural shelter for the balloon just before ascension.

High-Lights and Side Lights

by M. A. RODDY

Pertinent and timely remarks upon aviation personages and doings in the aviation industry. The clearing house of aviation news in brief.

WITH the Senate vote in the immediate offing on the bill which will create permanent air mail legislation, the United Air Lines Transport Corp., Pacific Air Transport Company and Boeing Air Transport, Inc. have announced their intentions of suing the United States for a total of $3,000,000 in the Court of Claims as a result of Postmaster General Farley's cancellation of air mail contracts.

Briefs for the companies contend that the airlines went to great expense obtaining new equipment at the solicitation of former Postmaster General Walter E. Brown for the purpose of adjusting mail operations to the advances of flying. Despite this pending suit, the Postmaster General again leads with his chin with the recommendation which he has placed before President Roosevelt requesting that the Pan American Airways contracts be reduced by not less than 25 per cent, which would mean an approximate loss of $1,700,000 annually to the company, in which I believe Vincent Astor is interested besides owning the NOURMAHAL.

* * *

WHILE the probers were probing to determine WHAT caused the T. W. A. airliner Sky Chief to crash, killing five, including the pilots and Senator Bronson Cutting and injuring eight, Dave Behncke went into action and demanded an immediate investigation of waiver operations by certain airline companies which resulted in the Air Bureau of Commerce issuing a bulletin notifying all operators that airline pilots shall not fly more than eight hours continuously out of twenty-four and that waivers or special dispensations granted heretofore at the request of certain airlines will no longer be tolerated. Another very important question pertaining to public safety is the matter of SUFFICIENT RESERVE FUEL. . . . According to witnesses, as Pilot Bolton lay dying beside his wrecked plane, he said that he had RUN OUT OF GAS.

* * *

NO DOUBT Eugene Vidal knows that his wife, Nina, daughter of Senator Gore of Oklahoma, has departed for Reno, the place where Barbara Hutton left her prince for a count, but I wonder if he is aware of the fact that many points relative to the T. W. A. crash which as yet have not been made public have been forwarded to members of Congress.

* * *

FLYING a sister-ship of the ill-fated T. W. A. luxury liner, Pilot D. W. (Tommy) Tomlinson and Copilot Joseph Bartles recently returned to the United States eight world records and also established or broke eleven American records.

As soon as propeller adjustments may be made, Tommy intends to take a crack at two altitude records for loaded planes now held abroad. It looks as if it has been discovered that it is not necessary to send along swivel-chair pilots in order to break records for page one. . . . Pilots who ACTUALLY FLY are just as good copy.

* * *

COL. Charles A. Lindbergh has deeded to the Missouri Historical Society his priceless collection of trophies, which range from chewing tobacco to a $50,000 pair of sixteenth century globes. Included among the gifts, which total more than three thousand, are decorations from twenty governments, including the Congressional Medal of Honor, 18 gold keys to cities in Europe and America, 49 gold life-membership passes, innumerable busts of Lindbergh, 100 medals, 256 books, 64 models of the "Spirit of St. Louis," many gold and silver loving cups, scores of gold and diamond studded pieces of jewelry and last but not least, the grease-spotted khaki suit worn by "Slim" who flew the Atlantic just eight years ago on May 20.

Billy Parker, who made a 1,400 mile trip in his Orion in 5 hrs., 10 mins.

* * *

I HAPPENED to run across Amelia, who had just been awarded the Gen. Italo Balbo medal by the Italian Consul General Castruccio, and was about to board an eastbound T. W. A. airliner. It was rather funny to learn that, according to our rules and regulations, Amelia, premier woman flyer, had actually reentered the States illegally and was subject to a $500 fine following her great non-stop flight from Mexico City to New York.

But that is not all, as a few days later when Amelia Earhart went out to the airport to check her plane she discovered that the N. A. A. barograph was STILL SUSPENDED inside the cabin on the same shock-absorber cords that had held it all the way from Mexico City and the instrument which would attest that she had made no intermediate landing on the 2,100-mile flight was still recording.

Lieut. Aldworth was overwhelmed as he believed the barograph was safe in the airport's office strong box.

* * *

LINCOLN ELLSWORTH is planning a third attempt to span by air the Antarctic Continent from Weddell Sea to the Ross Sea and has selected H. Hollick-Kenyon as chief pilot and J. H. Lymburner as second pilot. Ellsworth will take along as mascots a toy Mickey Mouse and an ox shoe found in Death Valley.

* * *

IT HAS been seventeen years since Lieut. Torrey Webb flew from Belmont Park, L. I., in an old "Jenny" to Washington with the first load of air mail, so it was quite appropriate that when Air Mail Day was celebrated at the opening of the new $500,000 Administration Building at Newark, the old pioneer, Jack Knight of the United Air Lines, who has been flying airmail for sixteen of his seventeen years of flying service, should carry a souvenir air mail bag to New York.

* * *

WITH France claiming a new world's airplane speed record for 392 miles per hour, established by Raymond Delmotte in competition for the annual Coupe Deutsch de la Meurthe, the most prized speed trophy in French aviation, announcement has been made that a new mystery speed plane, years ahead of anything now in the air, is being tested for the United States army with the utmost secrecy by the Curtiss Aeroplane & Motor Company in Buffalo, N. Y. Test Pilot Childs describes the performance of the new plane as "wonderful."

* * *

AND now we come to the glider-train which has completed the first international round-trip between Miami and Havana. . . . Pilot Elwood Klein towed the two gliders which were piloted by E. Paul Dupont of Wilmington

and Jack O'Meara, of New York, who some months ago made similar flights from New York to Washington and Baltimore. . . . It won't be long until we can take a kite home.

* * *

HOWEVER, while we are waiting for advanced kite checking, I mean flying, we have Miss Alice Gibson in a white bathing suit "bumming" sky rides from Miami, Fla., to New York in order to win a $1,000 bet. . . . Well, Alice, if the suit wears out you better have the pilot do a couple of barrel rolls.

* * *

CAPT. Lewis A. Yancey, famous New York-to-Rome flyer, has retired his autogiro plane, "Miss Champion," with which he has covered North and South America on good will flights for the past several years and will present it to the Rosenwald Museum of Science and Industry.

* * *

FRANK HAWKS, who has just completed a trail-blazing flight for the proposed Pan American air races between Buenos Aires and Los Angeles, narrowly escaped crashing over the tropical jungles of Panama when ICE formed in his carburetor while flying blind at 18,000 feet.

* * *

ABOUT the same time Sir Charles Kingsford-Smith and his navigator, Captain P. C. Taylor, "thought they were gone" when the motors failed in the veteran airplane Southern Cross over the storm-lashed Tasman Sea. . . . Taylor risked death by climbing six times out on the plane's wings to transfer oil in the two sputtering motors.

* * *

THEY tell me that my old friend Steve Dunn, who has been flying these many years for the Cristobal division, C. Z. of Pan American Airways, has given up collecting shrunken Indian heads and has taken up fishing. No doubt by next month's issue I will hear all about the big one that got away.

* * *

DID you know that Pilot R. T. Parks, Jr., accompanied by Pilot Fritz Sterling, flew a new Douglas from Los Angeles for Pan American operation between the northern tip of Chile to Santiago and that Pilot Parks brought his bride with him? Congratulations! By the way, I would like to know if Pilots Freddie Lord and Charles Purseley have taken on life copilots?

* * *

I WAS just wondering what to write next when none other than E. Hamilton Lee, daddy of all airmail pilots, walked in. Lee looks as young as ever and has logged over two million miles of air travel, having over 15,000 hours in the air. At present the world's senior air mail pilot is flying for United Air Lines.

END.

P. A.'s Aeronautical Directory

In this department, continued from the last issue, will be found the addresses of engine manufacturers, accessory manufacturers and dealers in aviation supplies.

ACCESSORY & SUPPLY DEALERS

Air Associates, Inc., General airplane accessories and supplies. Roosevelt Field, Clinton Road, Garden City, N. Y. Municipal Airport, 5300 W. 63d St., Chicago, Ill. Grand Central Airport, 1200 Airway, Glendale, Calif.

Aviation Products, 619 S. Federal St., Chicago, Ill. Helmets, clothing, accessories.

Burke, N., 4003 Roland Ave., Baltimore, Md. General supplies.

Eagle Aircraft Supply Co., St. Johnsbury, Vt. General supplies.

Hibbs, Fort Worth, Texas. Supplies, propellers, etc.

Logan Aviation Co., 716 W. Superior St., Cleveland, Ohio. Airplane and engine parts, accessories, supplies.

Montgomery School of Aeronautics, Aviation Supply Division, Montgomery, Ala. Wholesale aircraft supplies.

Nicholas-Beazley Airplane Co., General supplies and accessories. Marshall, Mo., headquarters, general offices. Floyd Bennett Field, Brooklyn, N. Y. 6235 San Fernando Rd., Glendale, Calif.

Northrop (Marvin A.), Aeroplane Co., Minneapolis, Minn. Supplies, accessories, used planes and engines, war souvenirs.

Ort, Karl, 608-640 W. Poplar St., York, Pa., General accessories and supplies, used and new engines, war souvenirs, materials, etc.

Universal Aircraft Co., Fort Worth, Texas. Propellers, new and used engines, etc.

Pacific Airmotive Corp., Ltd., Airplane and engine supplies and accessories. Union Air Terminal, Burbank, Calif. San Francisco Airport, San Francisco, Calif.

BEARINGS (BALL AND ROLLER)

Bantam Ball Bearing Co., South Bend, Ind.

Fafnir (The) Bearing Co., New Britain, Conn.

Fisher Ball Bearing Corp., 33 W. 60th St., New York, N. Y.

New Departure Mfg. Co., Bristol, Conn.

Geoffrey G. Kruesi, inventor of the Fairchild-Kruesi radio compass. Compass made by the Fairchild Aviation Corp., 62-10 Woodside Ave., Woodside, L. I., N. Y.

The DeLuxe Handy Grinder for light grinding, drilling, carving, sawing and engraving. Weight 15 ounces. Chicago Wheel and Mfg. Co., 1101 W. Monroe St., Chicago, Ill.

Norma-Hoffmann Bearings Corp., Stamford, Conn.

SKF Industries, Inc., Philadelphia, Pa.

Timken Roller Bearing Co., Canton, Ohio.

BEARINGS (PLAIN)

American Non-Gran Bronze Corp., Berwyn, Pa.

Bound Brook Oilless Bearing Co., Bound Brook, N. J.

Bunting Brass and Bronze Co., Toledo, Ohio.

BOOKS

Cornell Co-Op Society, Ithaca, N. Y. Text on Elementary Aerodynamics.

Goodheart-Willcox, 2009 So. Michigan Ave., Chicago, Ill. Complete line of books on all aviation subjects.

Jasco, 328 E. Sixth St., New York, N. Y. Junior Aeronautics Year Book.

McGraw-Hill Book Company, New York, N. Y. Technical books on aviation, textbooks, etc.

National Distributors, 1828 Locust St., St. Louis, Mo. Aero Blue Book.

Popular Aviation, 608 S. Dearborn St., Chicago, Ill. Complete line of books on all aviation subjects.

Rand McNally & Company, Chicago, Ill. Airway maps, books on meteorology and selected aviation subjects.

Ronald (The) Press Company, 15 E. 26th St., New York, N. Y. Complete line of books on all aviation subjects.

COWLS—STREAMLINES—COLLECTORS—SHEET-METAL AND WELDING JOBS

American Tube Bending Co., New Haven, Conn. Collectors, manifolds.

Buhl Stamping Co., 2730 Scotten Ave., Detroit, Mich.

Engle Aircraft Specialties, 1729 Standard Ave., Glendale Calif. Cowlings, streamlines, nose spinners, wheel pants, exhaust rings, tanks, etc.

Fleetwings, Inc., Bristol, Pa. Cowls, streamlines, airplane sheet metal work, etc.

G & O Mfg. Co., New Haven, Conn.

General Sheet Metal and Welding Co., Roosevelt Field, Mineola, N. Y. Airplane sheet-metal work, streamlines, etc.

Hill Aircraft Streamliners Co., 814 Reddy St., Cincinnati, Ohio.

Magosy & Buscher, 120 Walker St., New York, N. Y.

(*Continued on page* 129)

Are Airplane Fires Whipped?

by S. R. WINTERS and MARY BOWLES

Describing some very recent and important experiments made in developing fireproofing methods for airplanes. This is the most important of modern research in the pursuit of safety.

THE ever-increasing airplane disasters caused by the igniting of the highly inflammable fabric with which the planes are covered, has prompted an investigation by the National Bureau of Standards with the financial assistance of the Advisory Committee for Aeronautics to develop a nonflammable doped fabric for aircraft.

It is not unusual to find an account in the newspapers of an accident in which the pilot and sometimes several passengers, plunge to their deaths in a flaming plane. In many cases, even though the plane might have had motor trouble, the pilot could have landed safely had the fabric covering not ignited.

On December 19, 1934, a sleeper plane of the American Airlines was destroyed by fire after landing in Buffalo, N. Y. The passengers escaped injury, but only one motor of the ship, valued at $50,000, was saved and some of the mail was destroyed. It is believed that one of the motors backfired, causing the blaze.

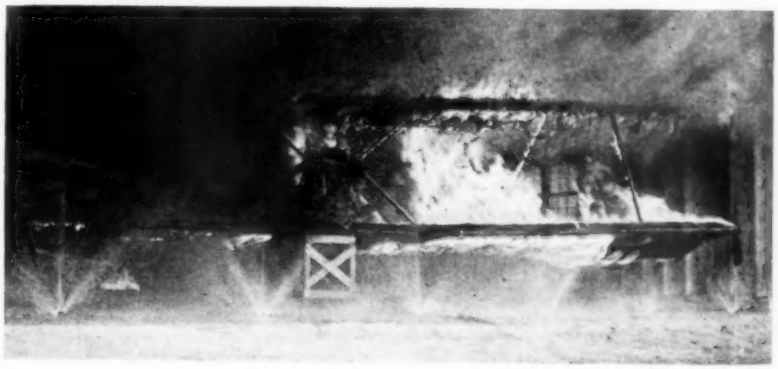
Several months later, on February 6, a fire swept through the Department of Commerce hangar at Bolling Field, Anacostia, D. C., destroying three airplanes, four automobiles and causing other damage estimated at $100,000. Among the planes destroyed was a new Fairchild monoplane. The destroyed equipment included five new airplane motors and $10,000 worth of new airplane propellers. A short-circuit in the radio transmitter of one of the planes, on which a mechanic was working, started the fire and the flames spread so rapidly that the fire-fighters were unable to save any of the equipment.

A few days after this disaster, a similar fire broke out in a hangar at Bellanca Field, Newcastle, Delaware, and two planes were destroyed. These are only a few instances of the havoc wrought by the ever-menacing fire hazard and the problem of eliminating this danger is a most important one. The careless toss of a cigarette or lighted match, the back-firing of the motor or the settling of a spark from a flue upon the fabric covering of a plane has caused the loss of thousands of dollars worth of valuable aircraft.

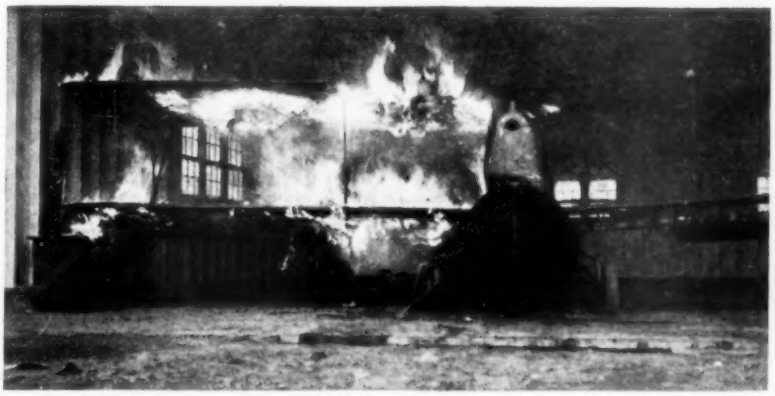
Although metal is replacing other materials in the construction of airplanes, thus reducing the danger of fire—nevertheless, fabric will continue to be used because it is less expensive, more available and easily repaired. The fabric is used particularly on passenger planes and, therefore, it has become a matter of prime importance to develop a fire-proof fabric for aircraft.

Dr. Gordon M. Kline, of the National Bureau of Standards, has conducted experiments to develop a satisfactory nonflammable dope with which to cover the fabric on the wings and fuselage of airplanes. Cellulose nitrate is the dope now commonly used for this purpose, but no method was found of fireproofing the fabric doped with this chemical so that it would still retain its tautness and weight requirements.

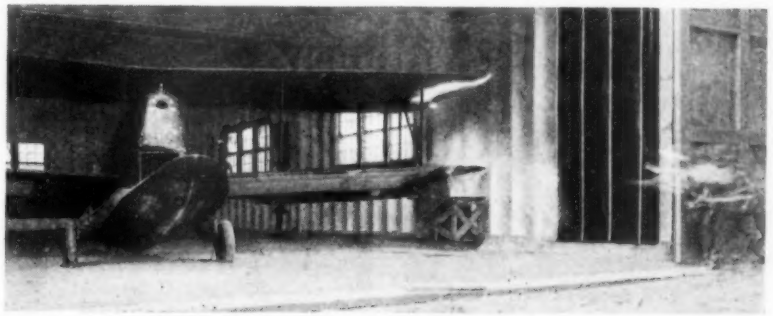
However, according to Dr. Kline, "an airplane covering with excellent resistance to ignition was obtained by the application of a 3:7 boric acid-borax mixture to airplane cloth and subse-



This picture shows the inflammability of cellulose nitrate.



Another experiment with cellulose nitrate.



Covered with acetate dope finish but without fire-proofing fabric. The latter burned off left wings but right wings were unaffected.

quently doping it with cellulose acetate. This doped and fireproofed cloth, containing approximately 5 percent of the boric acid-borax by weight, did not burn in a horizontal or vertical position and was not ignited by lighted matches nor burning gasoline."

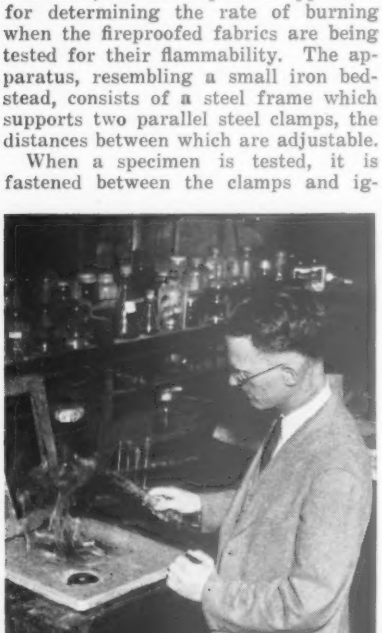
An airplane dope, to be satisfactory, must tauten the fabric and dry quickly without "blushing," give a smooth strong surface and permit a low-film weight. By "blushing" is meant the precipitation of the cellulose derivative in white patches because of the condensing of the moisture. To these requirements of doped fabric should be added the important one of fire-resistance.

In making the tests, 12-inch-square panels were prepared from dressed white pine. Grade "A" mercerized cotton airplane cloth was stretched over each panel and attached on with tacks about 1.5 inches apart. Four-coat applications of the various chemicals were applied to the cloth. The panels, after drying overnight at room temperature were then placed in a temperature of about 21 degrees Centigrade and 65 percent. humidity.

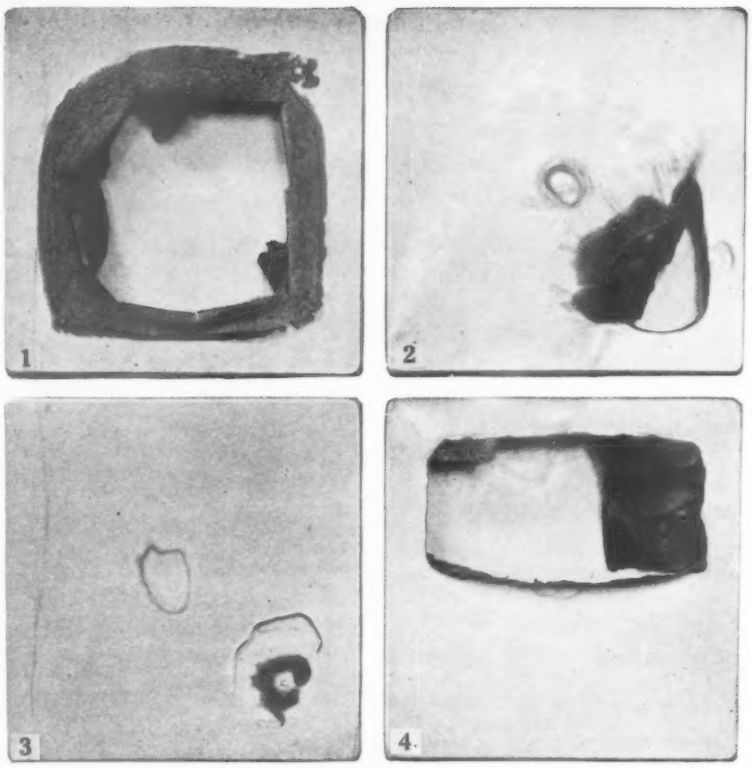
Approximately 48 hours later, the tautness was determined with a McGowan tautness-meter. Two-by-four inch pieces of the doped fabric were cut by a die from a strip at the center after the fabric was removed from the panels and these samples were then weighed in the conditioning room on a chemical balance.

C. R. Brown, of the Fire Resistance Section of the National Bureau of standards, has developed an apparatus for determining the rate of burning when the fireproofed fabrics are being tested for their flammability. The apparatus, resembling a small iron bedstead, consists of a steel frame which supports two parallel steel clamps, the distances between which are adjustable.

When a specimen is tested, it is fastened between the clamps and ignited at one end. A stop watch records the time required for the flame to travel over a specified distance and the rate of burning in inches per minute is determined. This test machine was also employed in making vertical burning experiments. The latter upright position was necessary in conducting tests on cloth having fireproofing chemicals which render the fabric virtually nonflammable in the horizontal position.



Dr. Gordon M. Kline, National Bureau of Standards, who developed method of treating fabric.



1. Airplane cloth doped with present cellulose nitrate was consumed when sprayed with gasoline. 2. Untreated cloth doped with newly developed cellulose acetate, slightly burned but fire did not ignite fabric. 3. Fireproofed airplane cloth using cellulose acetate. Gasoline did not consume the fabric. 4. Comparative test with part doped with nitrate and part with the acetate. The latter was unaffected by gasoline.

Specimens with surfaces two inches wide for the horizontal test and one inch wide for the vertical test were put between the clamps. The cloth was ignited with a match and, after starts of two and three inches, respectively, for the horizontal and vertical positions, the time was recorded for the flame to travel 12 inches. The tests for determining the inflammability of the fabric were made in the still air of the laboratory about one week after doping the cloth.

Three chemicals—chlorinated diphenyl resins, vinyl chloride resins and casein—produced a doped fabric which resisted fire to a greater degree than cellulose acetate. However, these resins did not give satisfactory tautness.

Plain airplane fabric, treated with cellulose acetate dope, is slow to ignite even though lighted matches or cigarettes are dropped on it in a breeze. Once it takes fire, it does not burn rapidly. The same airplane fabric, coated with cellulose nitrate, will ignite instantly and is quickly destroyed.

However, it was found that if the fabric was first fireproofed with a fire-retarding salts, namely, a boric acid-borax mixture, before it was coated with cellulose acetate, the cloth would not burn twelve inches in either a horizontal or a vertical position.

Moreover, if the horizontal surface of the doped and fireproofed cloth is sprayed with gasoline and ignited, the gasoline will burn off without setting fire to the fabric. It has been found necessary to experiment further on the permanence of the fire protection of the boric acid-borax mixture, but it has been noted that the mixture has no deteriorating effect on the airplane fabric.

During the War, the United States Government made a thorough study of the use of cellulose nitrate and cellulose acetate as airplane dopes. It was discovered at that time that it was very dangerous to use the cellulose nitrate dope on the planes that were to be used at the war front, because it was so highly inflammable.

Therefore, the fabric on the planes that were to be sent into the zone of fi.e was covered with cellulose acetate dope, but they continued to use the cellulose nitrate on the ships that were used for training purposes. The less hazardous cellulose acetate dope was not used entirely because it was more expensive than the cellulose nitrate.

(*Concluded on page* 126)

"Flying Flea" is France's New Pet

by E. C. CLARK

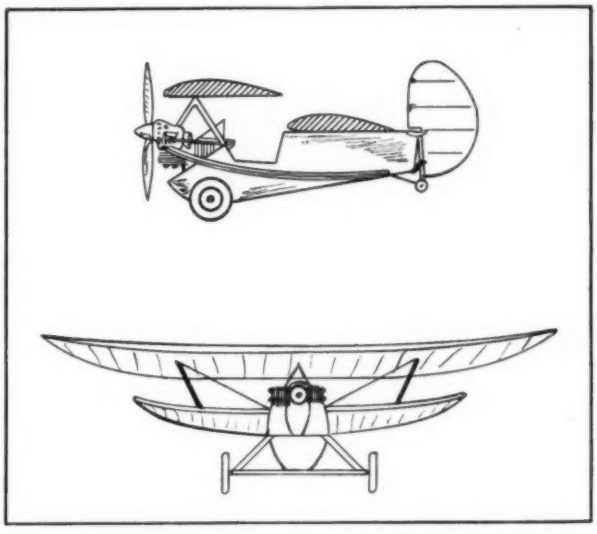
Lightplane fans in this country will be greatly interested in the novel little French Lightplane described in this article. Its novelty lies in the disposition of its wings which, contrary to precedent, are of the tandem type.

HENRI MIGNET, a French amateur flyer and aircraft builder, after fifteen years of experimentation, has designed and built a plane which is transforming the field of private flying in France, and which may even have its effect upon all future aircraft design.

The "Pou-du-ciel," or "Flying Flea" which he has produced has shown itself in practice to be safe in design, cheaper to construct than a low-priced automobile is to buy, easy to build by a group of amateurs in a few weeks' time, flyable by the average individual without flight training and economical in operation.

The possibility of combining all these features in one ship, though difficult to credit, appears to be evidenced by the facts drawn from reports of the numerous "Pous" built and flown in France and other European countries within the last few months.

If disinterested analysis of Mignet's design reveals no unsuspected weakness, its influence on aircraft design in general cannot be overestimated. The seriousness with which it is being regarded abroad may be seen from the fact that the Service Technique de l'Aeronautique, the French counterpart of the Air Corps Materiel Division at Wright Field, has commissioned Mignet to build a "Flying Flea" for it.



The cross-hatched surfaces in the upper view indicate the tandem wing surfaces. This little plane has created a sensation in Europe.

During his fifteen years of experimentation in design and construction of aircraft, beginning with gliders and continuing through the building of light-powered planes, culminating in the H.M.8, a ship of somewhat orthodox design, Mignet reached the conclusion that the amateur flyer needs a plane constructed on entirely different principles from those in use. The present plane, he writes, is a descendant of war planes in which great maneuverability is desired, and which can be flown only by individuals selected for special aptitude from a group already selectively formed from applicants of a certain age and physical condition.

In the post-war development of aircraft the desires and potentialities of the average would-be flyer have been ignored. The acquisition of a coordinated technique in the use of hand and foot controls is beyond most people, Mignet argued. Therefore, his task was to design a plane which would be inherently stable and one in which the controls would be not only concentrated in one hand, but also would be correctly responsive to normal reaction movements.

His plane, he felt, must be safe in construction and control, light in order to secure the smallness of size which would admit of the use of a low power unit, which could give economy only in operation. After numerous experiments, some of which were conducted in his own wind tunnel, Mignet arrived at the "Flying Flea," which is sometimes called in English circles, "The Flying Slot."

The "Flea" is an open cockpit, single (or in modifications, two) seater, tandem-wing ship, without ailerons, elevators, nor rudder bar, weighing about 200 pounds, empty, costing in the neighborhood of $100 to build (without motor) by amateur labor, having all controls concentrated in the stick and powered by a two-cylinder motorcycle engine.

The materials used are three-ply over strips of pine, metal fittings, steel cable, bicycle tubing, linen covering, glue and varnish. A wheel is used in place of the tail skid. The propeller is made from a single piece of wood. The ship is equipped with a speed indicator and an altimeter, and sits so low to the ground that the pilot can lean out and himself pull the chocks from the wheels, storing them in the luggage box behind him.

In developing his design, Mignet has returned to the tandem-wing principle used by Samuel Pierpont Langley in 1903 and tested in the early experiments of Gustave Eiffel. With the tandem-wing principle of divided lift, Mignet has introduced the innovations of direct control of lift, suppression of ailerons and concentration of controls in the stick.

The forward wing, the span of which is about 16 feet, is pivoted and coupled directly to the pilot's stick by two wires attached to its rear edge, giving direct control of fore-and-aft movement by tilting the wing. By a slight upturn of the trailing edge of the forward wing, the center of pressure is stabilized, being always behind the pivoting point near the front spar. If a wing section of ordinary curvature were used, the center of pressure would move back as the angle of incidence decreased and the load on the control stick would be increased to such an extent that it might become unmanageable.

The rear wing, which is smaller than the front and is fixed in position, is placed somewhat below the forward wing, resulting in a slot or Venturi effect between the wings. A sharp dihedral, as in Langley's plane, is given the wings for lateral stability. The amount of lift given by the rear wing varies with the position of the pivoting front wing, the quantity of work done by each wing depending on the interaction of the two together.

Because the rear wing is working in a downwash of air from the forward wing, its angle of incidence to the air in which it is working is less than that of the front wing. Therefore, both wings do not reach the stalling angle at the same time and the rear wing will be reaching its maximum lift coefficient at the time the forward wing has passed it, resulting in a damping out of the undulating flight path of the forward wing. Any tendency of the forward wing to go into a spin is resisted by the rear wing which is still carrying its full load, therefore a tandem wing arrangement, it is claimed, is not likely to spin unless the relative angles of the

wings are too close, or both wing loadings too nearly equal.

In Mignet's design, the weight is centered well forward, placing the center of gravity below and behind the line of the wind shield, so that the larger forward wing is more heavily loaded per foot of wing surface than is the rear wing.

In working toward his ideal of a plane of great natural stability, Mignet felt that there are two elements of the orthodox airplane which lead to trouble in the hands of any but expert flyers: the ailerons, and the foot control of the rudder. The necessity of employing two actions, the use of the ailerons and the rudder, either together or in opposition, to obtain one result, a proper turn, seemed to him another evidence of which he calls "delayed control" and as such, potentially dangerous. The delayed control of fore and aft movement he believed he had largely eliminated by coupling the tilting forward wing directly to the pilot's stick.

To develop his controls so that they would all be hand controls and thus respond correctly to the natural reactions of the hand, as previously learned by most aspirant flyers in steering bicycles, automobiles and other craft, Mignet determined to suppress the ailerons and with them, much of the spin potentialities of aircraft. He believed that if he could place his center of gravity low enough in relation to the side areas of the machine, the fuselage would swing itself out in a pendulum motion on a turn, resulting in a natural bank.

In experimenting with this idea, he placed a fixed fin ahead of the rudder but found the machine refused to turn with it. Eventually the fin was taken off and a horn balance made for the rudder. In its perfected form, Mignet claims that in a bank of up to 45 degrees the bank follows automatically on the use of the rudder, controlled by a left-to-right movement of the stick.

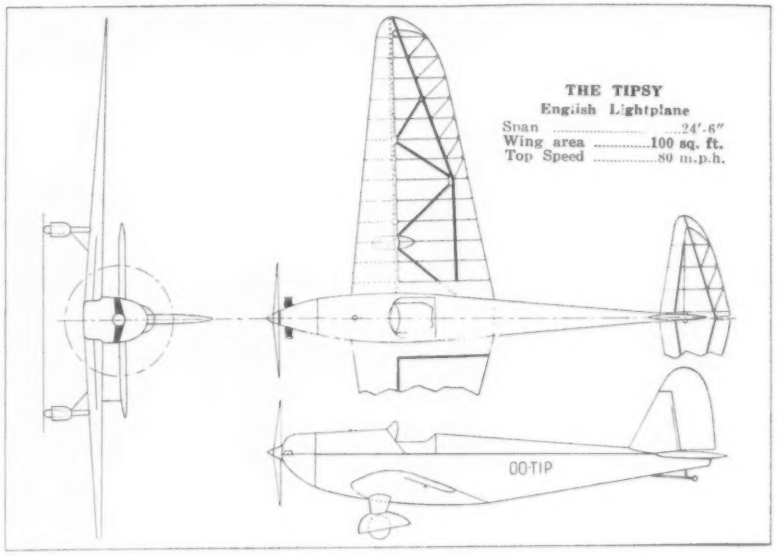
If a steeper bank is desired, it becomes necessary to pull a little upon the stick as in an orthodox ship. In practice the use of the rudder produces yaw and the sharp dihedral of the main planes, together with the small span of wing and the placing of the main weights below the wing, produces lateral stability.

The engine is mounted about midway in the space between the fore end of the cockpit, and the forward wing. Two-stroke, two-cylinder motorcycle engines generally are being used. In France the air-cooled Aubier et Dunne, and the Poinsard motors are popular for this use. They are 20 or 25 h.p. motors with a maximum speed of around 60 m.p.h. A modified Giliet motorcycle engine has also been used. In Belgium the engines of the Saroléa firm, makers of four types of motors for light planes, probably will be employed.

In England, Sir John Carden, a friend

(*Concluded on page* 127)

"Tipsy," England's New Lightplane



The wing structure and bracing system of the Tipsy is unusual but effective.

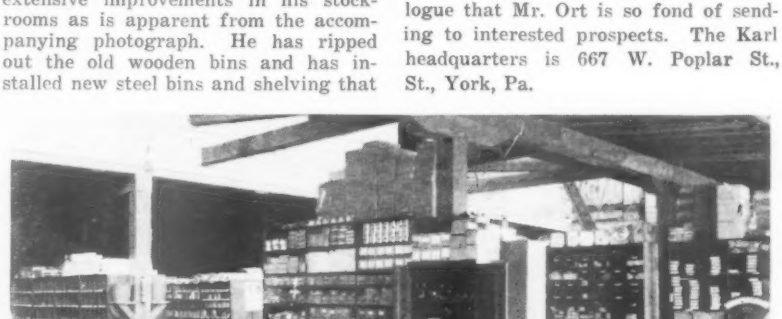
THIS is an odd name for a lightplane, the "Tipsy S," but it is a perfectly natural name for the reason that it was designed and constructed by Mr. E. O. Tips, manager of Avions Fairey, Gosseillies, Belgium. It is really a lightplane, a single-seater, that cruises at 70 m.p.h. with a 600 c.c. Douglas 2-cylinder opposed engine.

It has a wing span of 24'-6" and a wing area of 100 sq. ft. The maximum speed is 80 m.p.h. and the stalling speed is 40 m.p.h. A run of 500 feet is required for a take-off in calm air. The wing section is the R.A.F.-48 near the root, changing to R.A.F.-38 and R.A.F.-28 near the tips.

The main wing spar is of "I" section, placed at the deepest section point with an auxiliary box spar. The leading edge is a stress carrying member of plywood. The fuselage has spruce longerons covered with a stress carrying skin of plywood. Intermediate bulkheads hold the longerons and skin in place.

Karl Ort Dolls Up His Stockroom

KARL ORT, the well known aviation supply and accessory dealer of York, Penna., has been making some extensive improvements in his stockrooms as is apparent from the accompanying photograph. He has ripped out the old wooden bins and has installed new steel bins and shelving that are a vast improvement. Mebbe, one or more of the new bins will be used for storing the "twenty-five cent" catalogue that Mr. Ort is so fond of sending to interested prospects. The Karl headquarters is 667 W. Poplar St., St., York, Pa.



Showing Karl Ort's modernized stockroom.

Kontact Klub Kolumn

THOMAS "MARIO" BELLEVIA, please make contact with me as I have numerous experiments to conduct on aircraft and would like to avail myself of your services.—CHARLES A. HEGYES, formerly with American Airplane and Engine Corp., Engineering Dept., Farmingdale at Ronkonkoma, N. Y.

BUD KEELER, motorcycle 'drome rider and JIMMIE COBURN, former member of the Thirteen Black Cats. Would like to know what has happened to these two boys. Both in Los Angeles when last heard of.—BOB TOLIVER, Troy, Parisian County, Blackfoot, Idaho.

BOB MITCHELL, racing mechanic and R. F. C. pilot during the war. Formerly at the Ascot Speedway in L. A. with Ernie Tripplett. May be on a mail-line in the Southwest.—BOB (SLIM) TOLIVER, Troy, Parisian County, Blackfoot, Idaho.

WORLD WAR AVIATORS! Do you have photographs or albums consisting of actual war aircraft photos, both Allied and German? If so, please get in touch with me immediately.—JACK W. BRANT, 521 S. Duke St., York, Pa.

CONTACT wanted with someone with experience in flying. Write WARREN LUSE, Wilber, Nebr.

LYLE (SHORTY) BURCH, mechanic and parachute demonstrator, formerly of Tri-Cities Airport, San Berdo, Calif. Please get in touch with your former buddy of the defunct SW-Sc-of Aviation, and field.—C. E. LANGDALE, 649 Olive St., San Bernardino, Calif.

Britain Produces Light Engine

FOURTEEN months of intensive development have produced the Bristol Pegasus Series X engine which, in the course of an official 100 hours' test run, has recorded extraordinary figures in power output.

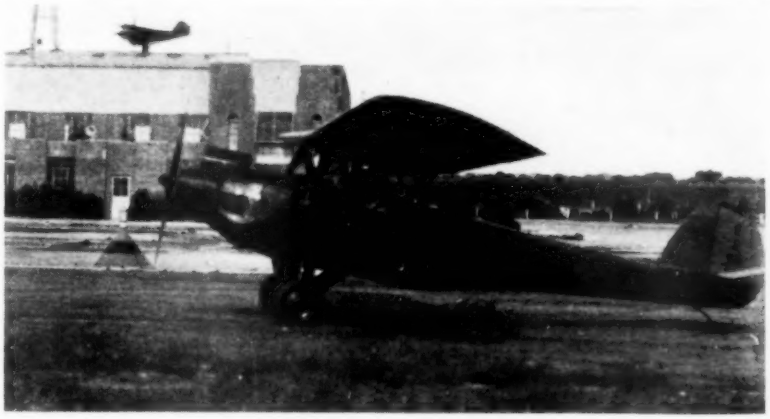
The first production series batch of the new unit is already in hand for delivery in the autumn for installation in new types of airplanes, and full quantity production is scheduled for the spring of 1936. It will supplant in the Bristol range the Pegasus III engine which was put into production in the autumn of 1933.

The new engine is notable for extremely high performance and low ratio of structural weight to power developed. Like the Pegasus III, which has exactly similar cylindrical capacity, it is a moderately supercharged 9-cylinder radial air-cooled engine, maintaining full power up to a height of 6,000 feet above sea-level. Its net weight is 995 pounds, and the power available for take-off, at normal engine speed of 2,250 r.p.m., is 920 h.p.

In other words, every horsepower is produced by 1.08 pounds of engine—an engineering achievement which is paralleled only in short-life racing aero engines that cannot fairly be compared with a production type.

Maximum power output at 6,000 feet up is 875 h.p. Average endurance powers during the test run were 710 h.p. for ninety hours (engine speed 2,250 r.p.m.), 888 h.p. for nine hours (engine speed 2,140 r.p.m.) and 795 h.p. for one hour. Oil consumption throughout the test averaged just over 10 pints an hour.

Once More Oklahoma Registers



This is Mr. R. B. Alston's sturdy little plane.

WE are mighty glad to hear from Mr. R. B. Alston again and thank him for the following very interesting letter that he has written to us. He's an old hand at this game and his success should be an inspiration.

Ponca City, Okla.
May 16, 1935.

IF YOU look back through a few issues, you will see that, over a year ago, I sent in a small picture of a little plane that I was building on the stage on one of our local theaters.

I got quite a kick out of what J. B. R. said about having them built in churches, barns and cellars, but to date this was the first theatrical job he had met.

Well, when we wheeled it out to the airport, there were quite a lot of people there to see what would happen. I am sure that most of them came out expecting to see some one get hurt and they were mighty skeptical. They thought I was crazy.

I can appreciate how Mr. Corben felt when people came from miles around to see him new Super-Ace fly with doubt in their minds as to whether it was all he claimed it to be, and I can again appreciate his feelings when he proved to all that his little ship would do all he said it would do.

After my little ship was flown, tested and put through the mill, the people who came out to see the slaughter came up with a hang-dog expression and fired a million questions at me, and not being satisfied with my answers, stormed the chap who did the flying and finally gave up with the idea that maybe I wasn't such a fool after all.

The pictures will prove, without a doubt, that my little ship really flies. It is built along the Baby Ace lines with an exception to span, which is twenty-eight feet. I changed the landing-gear and flying-struts, also, to do away with a lot of weight. I would like to say that one of the outstanding features of this little plane is the landing-gear, which was built by Mr. Cooper of the Sportsman Aviation Co., Hobart, Okla.

Those who have flown it say they have never flown a ship yet that landed and taxied with such ease and that there is never any rebound felt at all. It hits a clip of 90 miles an hour and will land at 25 m.p.h., which is something. It has a quick take-off, climbs like a pursuit ship and it will cruise with the Sensenich Henderson turning 2300, using a five-foot Sensenich special prop.

Although the landing speed is close to 25 miles an hour, there is perfect control at all times. It was looked over closely by an inspector, who didn't shake his head in the negative, which was a good sign. Although the ship is not licensed, it has many hours time behind it. Out of consideration and respect for the airport personnel and inspectors, it is never allowed to fly over town or over congested areas. We stick strictly to straight cross-country flying and the kind of straight flying that airplanes should be flown.

I am pretty proud of it because there has never been a single accident of any kind, and I know from seeing some of the landings that are made that she will take it. It has a safety factor of about ten to one and if no one wants to believe it, just drop in Ponca City some time and see for yourself, and at the same time have the pleasure of looking over one of the best airports and one of the most up-to-date and equipped hangars in the southwest (thanks to the Continental Oil Co.).

I would like to finish by saying that O. G. Corben knows his business when it comes to building light airplanes and that no one will ever go wrong if he follows his plans and instructions on the little ships that bear his name. And to those who are building a lightplane, they will do well to read Mr. Lorenzen's article in the June issue of POPULAR AVIATION, as the dope he gives out is no hooey and without a doubt one of the most important factors in the success of any lightplane.

Sportsman Pilot Honored

DR. JOHN D. BROCK, a physician who took up flying for the fun of it and who has set a record that no other pilot in the world, civilian or military, can equal, has recently been honored by the National Aeronautic Association. The aviation leaders of the nation gathered at Washington last month to pay tribute to the country's outstanding sportsman pilot.

For almost six years, Brock has made an airplane flight every day. Rain, fog, snow, ice, dust storms—nothing has kept him on the ground. His consecutive daily flights now number over 2,000.

Brock started out to hang up this record when once, before he had learned to fly, he declared that he believed flying every day was possible and was hooted at by experienced pilots. Brock decided then and there that he would show them, and he has.

On one occasion Brock flew for half an hour in a blizzard that kept every other pilot within hundreds of miles on the ground.

"Jump Take-Off" for Autogiros

THE new Autogiros to be produced by the Autogiro Company of America will be capable of something entirely unheard of in aircraft performance—a "jump take-off." The ship will leap up into the air from a standing start just like a cat jumping up on a fence post.

This is made possible by changing the angle of attack of the rotor blades while they are in motion. When the ship is ready for the take-off, the engine is started and the rotor begins to spin. The rotor is set at a flat angle of attack until it reaches a speed of 120 r.p.m.

Then the rotor is de-clutched and the blades are suddenly set at an angle of about 5 degrees. Thus they instantly produce a powerful lifting force and the 'giro shoots skyward without any forward roll at all.

This new system will be invaluable in getting out of small fields and in leaping over obstacles. It will be given a thorough test in the new autogiro now being constructed for the Development Section of the Bureau of Air Commerce.

McAdoo Appoints Assistant

SENATOR WM. G. McADOO, President of the National Aeronautic Association, has appointed Milton Reynolds special assistant to help promote interest in aviation and the Association throughout the country.

Mr. Reynolds has just completed 150,000 miles of flying in his Lycoming powered Stinson plane, which is still considered the record for private flying.

Some New Books Worth Reading

by J. B. R.

An old-time photograph of Grover Loening (standing) taken at a time when tractor planes with a fuselage were in their youth. Mr. Loening belongs to the aviation pioneers of America.

OUR WINGS GROW FASTER, by Grover Loening, Doubleday-Doran, publishers. Price $3.75. Publication date, April 26, 1935. 203 pages.

Almost any book by Grover Loening will attract the attention of the aviation world, for Mr. Loening is a pioneer and distinguished aeronautical engineer. His latest contribution to aeronautical literature is a surpassingly fine volume on the yesterday of aviation.

Grover Loening has been actively connected with aviation since its inception and he, as real pioneer in aeronautical engineering, is amply qualified to talk aviation history. He is best known to our readers, perhaps, by being the designer of the Loening amphibian, one of the most brilliant of his achievements.

The writer still has Loening's earliest book, "Monoplanes and Biplanes" in his possession. This was one of the earliest semi-technical American books on aviation, followed during the War by his book, "Military Aeroplanes," which was the standard book of the U. S. Navy and which was used by the British Royal Flying Corps. In this last and third book, he far surpasses his former efforts by getting off the beaten path and talking about the developments, early personalities and history of American aeronautics rather than the mechanics of the plane.

Many very fine rare photographs are reproduced in this volume which will be prized by the collectors of early airplane pictures. The book is magnificently illustrated and printed, and will prove the prize book in a collection of volumes on airplane history.

* * *

LEGAL

AIR LAW, An Outline and Guide to the Law of Radio and Aeronautics, by Howard S. LeRoy. Published by the author, 1935. 120 pages.

Any one wishing a brief reference to the various laws and decisions on the subject of aviation and radio, will find this little volume of great assistance. It treats of the laws in many foreign countries as well as in the United States and contains an excellent bibliography and list of radio and aeronautical publications.

* * *

EDUCATIONAL

RANKIN TEXT, by Tex Rankin. Published by the author. Eight volumes in set, price $16.00. Price per volume, $2.50.

This is a complete course of home-study (not a correspondence course) on the general subject of aviation, in eight volumes. It is the only authorized text on the "Rankin System of Flight Instruction," and is a detailed report on the conclusions arrived at by the author after 15 years of school supervision during which time more than 1,500 students were graduated. The various volumes may be outlined as follows:

Vol. 1. Theory of Flight. The atmosphere. Why and how an airplane flies. Definitions.

Vol. 2. Structures and Rigging. Structural parts of the airplane, materials, stresses, rigging, repairs.

Vol. 3. Air Traffic Rules. The Bureau of Air Commerce regulations relating to flying, use of the controls, taxying, etc.

Vol. 4. Primary Flying Instruction. Control exercises, straight flight, banks and turns, stalled flight, take-off, etc.

Vol. 5. Advanced Dual and Supervised Solo. The forty lessons are based upon the fifteen minutes air-time usually allowed at airports.

Vol. 6.—Aircraft Engines. Types of aviation engines, valves, carburetors, lubrication systems, ignition systems, etc.

Vol. 7. Meteorology and Navigation. A complete set of lessons dealing with weather conditions and the science of navigation.

Vol. 8. Advanced Flying. Acrobatic flying, split turns, rolls, spins, upside-down flying, cross-country flying, night-flying, etc.

A full set of questions is appended to each lesson so that the student can test himself on the knowledge gained from the book. Usually more than 100 questions follow each subject so that the reader can hold home examinations by himself.

* * *

STRATOSPHERE

1934 FLIGHT OF THE STRATO BALLOON "EXPLORER," by Lyman J. Briggs. Stratosphere Series No. 1, issued by the National Geographic Society, Washington, D. C. Dated 1935. 122 pages.

A fully detailed account of the National Geographic Society—U. S. Army Air Corps stratospheric flight of 1934 in the Balloon "Explorer." This technical paper takes up the design of the balloon, the details of the instruments employed and the data collected during the flight. A thoroughly scientific treatise dealing with the flight of 1934.

* * *

ENGINEERING

STRUCTURAL DESIGN OF METAL AIRPLANES, by John E. Younger. McGraw-Hill Book Company, Price $4.00. 344 pages. First Edition, 1935.

This is an engineering treatise on the design of metal airplane structures, the materials employed, indeterminate structures, theory of beams and struts, properties of special sections, loading, stresses, design of sheet metal skin structures, etc.

Prof. Younger, who is the professor of mechanical engineering, University of California, has produced a very timely book on a most important phase of airplane design. The subject is handled in a very comprehensive manner and contains many items of practical interest as well as technical discussions.

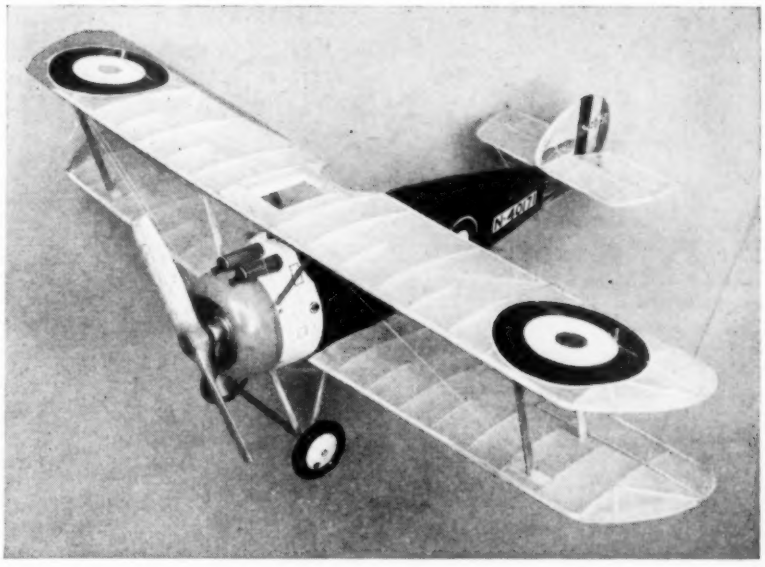
* * *

Consult the "Aeronautic Directory" for the addresses of the publishers or dealers handling aviation books.

Building the Sopwith Camel

by
PAUL W. LINDBERG

Model editor and designer for
POPULAR AVIATION



This is the model of the Sopwith Camel complete down to the hump. A dandy model for our readers who love the old wartime ships.

OUR readers were so pleased with the last wartime model and so, by popular request, we have drawn plans for an exact scale model of the Sopwith Camel F-1. The construction of this model is very simple. The weight of the model has been made as light as possible in order to obtain good flying qualities. The model is very stable and will fly a long distance.

All details, such as shock-absorbing, landing-gear, movable surfaces with aluminum hinges, correct markings, etc., have been carefully carried out. All dimensions can be quickly and accurately determined, by placing a ruler on part to be measured. If you wish a larger model, multiply this measurement by the amount of increase.

COLOR SCHEME

Fuselage—blue tissue; front section painted white; see plan. Cowl—red. Wings and tail surfaces—yellow. All struts — natural wood color. Please note: to eliminate weight, the model is covered with colored tissues and not painted with colored dopes.

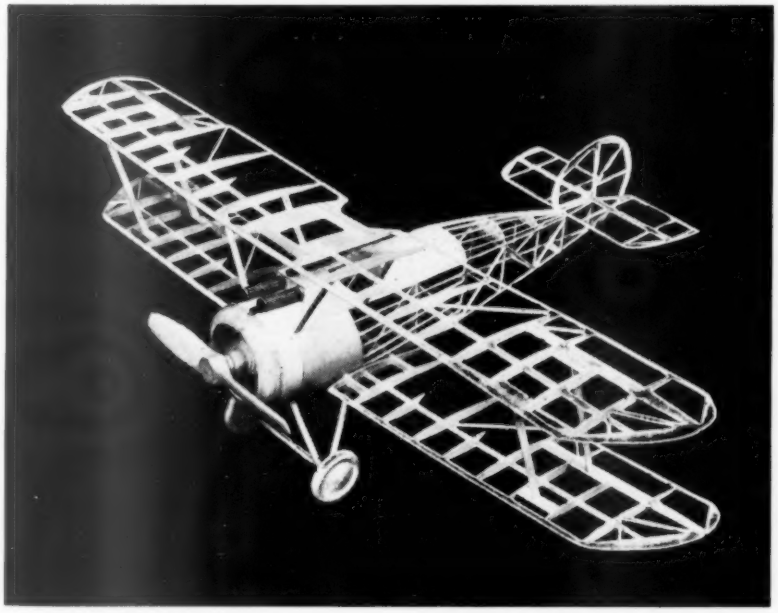
CONSTRUCTION OF FUSELAGE

First, place waxed paper on top of plan to prevent parts from sticking to paper. The fuselage sides are built from $\frac{1}{8}$-inch square balsa. The longerons, verticals, diagonal braces, etc., are held in place until securely cemented by inserting straight pins on either side of strips wherever needed.

When the two sides are completed, the cross-members are cemented into their proper locations. Check carefully front-to-rear for alignment. Cut the formers from $\frac{1}{32}$-inch sheet balsa and cement in their respective positions as shown on the plan. The position of the stringers are clearly shown on the formers. See plan.

Work stringers from front to rear and check carefully to see that they have the correct spacing.

Section of fuselage from formers 1-11 and 10, to formers 8 and 8, is covered with stiff paper. Formers 3 to 4 and 4 to 5 are covered with separate pieces of stiff paper.



The frame of the Sopwith Camel before covering. This photo will be of service in assembling the model.

CONSTRUCTION OF WINGS

Cut all ribs from $\frac{1}{32}$-inch balsa. Pin center spar in position on the plan. Now, cement ribs in their proper locations. The leading and trailing edges are cut and sanded to shape and cemented to the ribs. The upper and lower panels carry movable ailerons which are a great help in controlling the flights.

Make wing tips from $\frac{1}{16}$-inch thick balsa. We highly approve of this type of wing tip, because it is much easier to construct and neater in appearance.

ELEVATOR AND RUDDER

These are built on the plan and are made of $\frac{1}{16}$-inch square and $\frac{1}{32}$-inch sheet balsa. No trouble should result here, because they are very simple to construct.

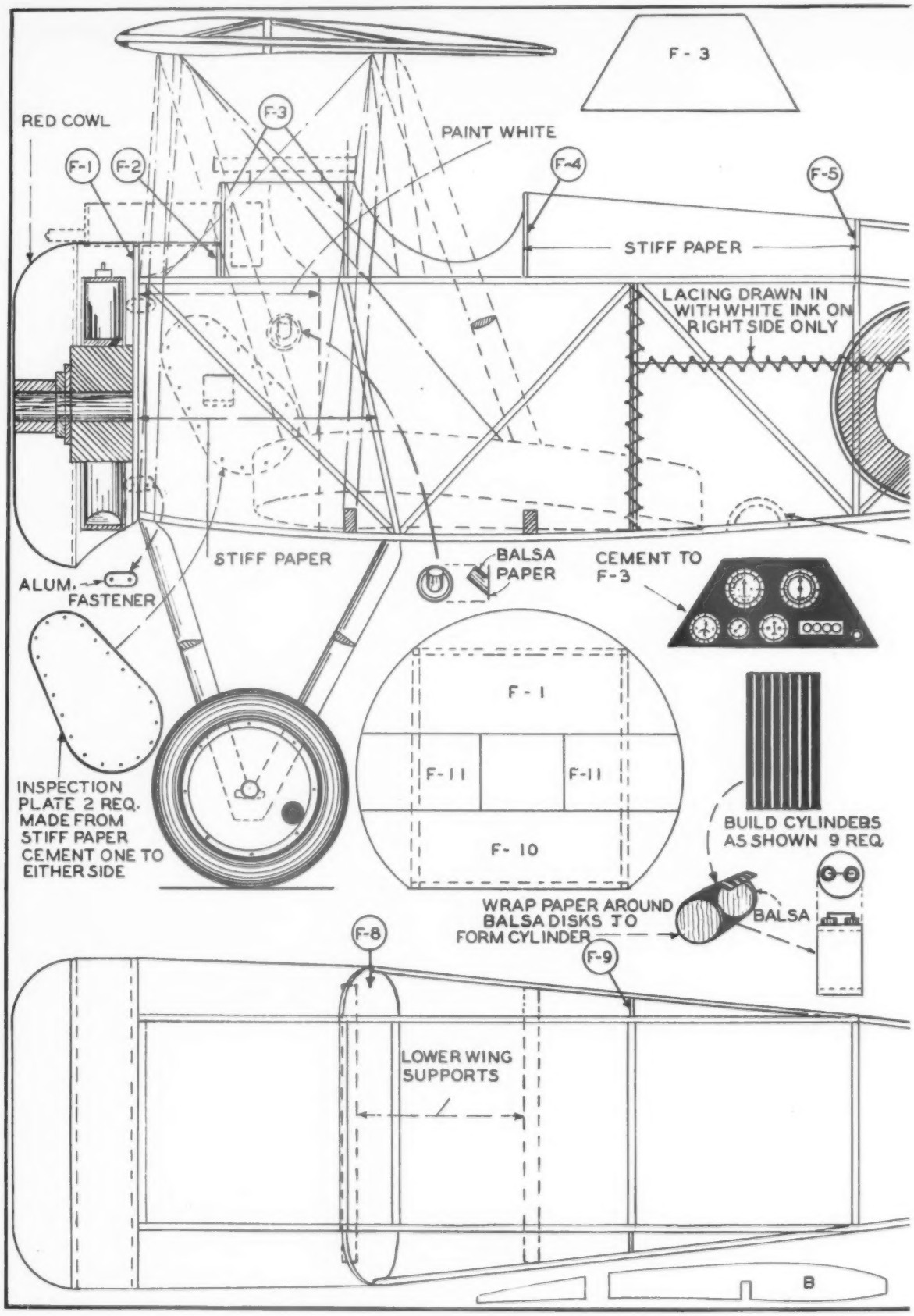
MOTOR

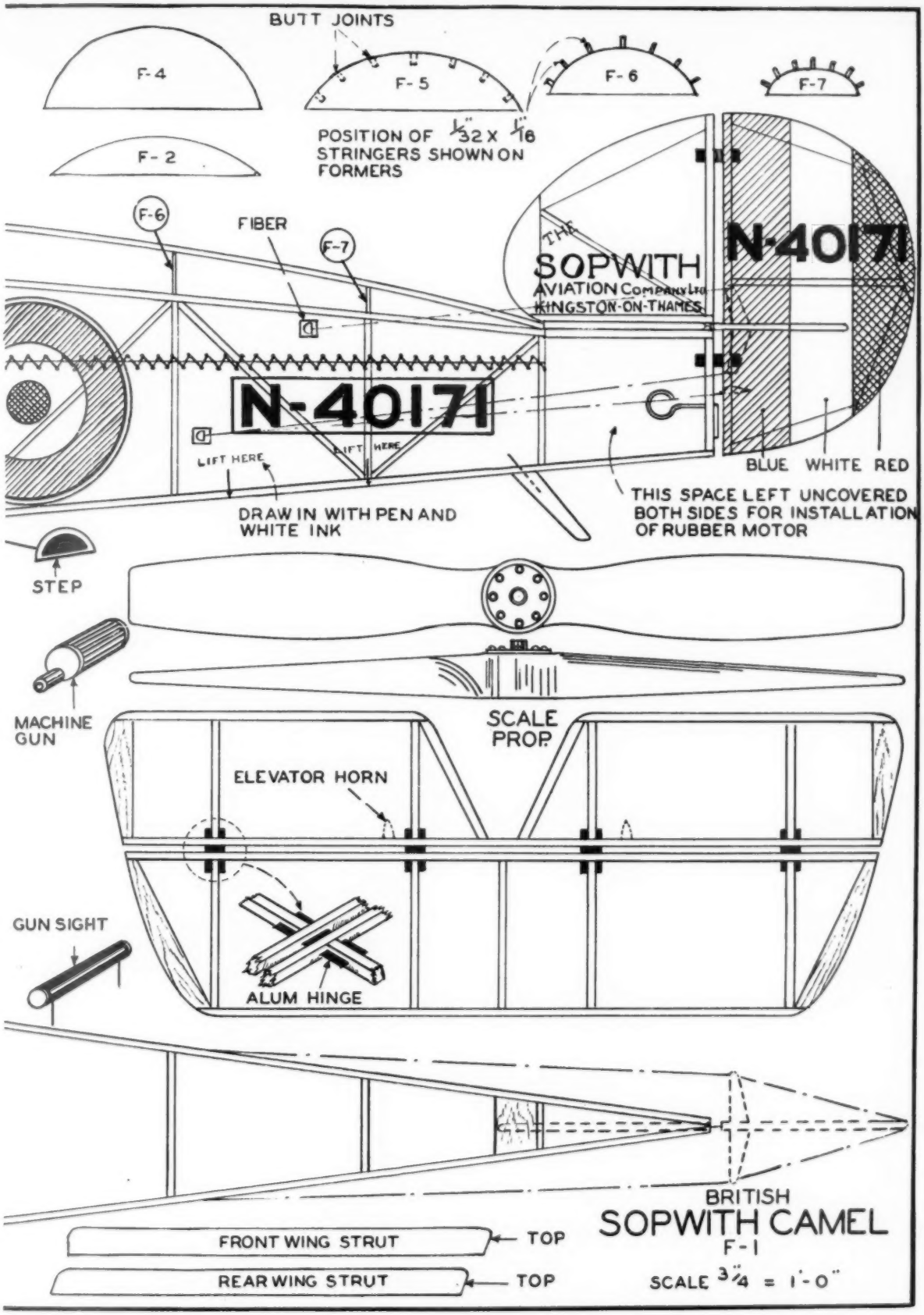
The motor cylinders are built up from sheet balsa and pieces of paper. Study plan carefully.

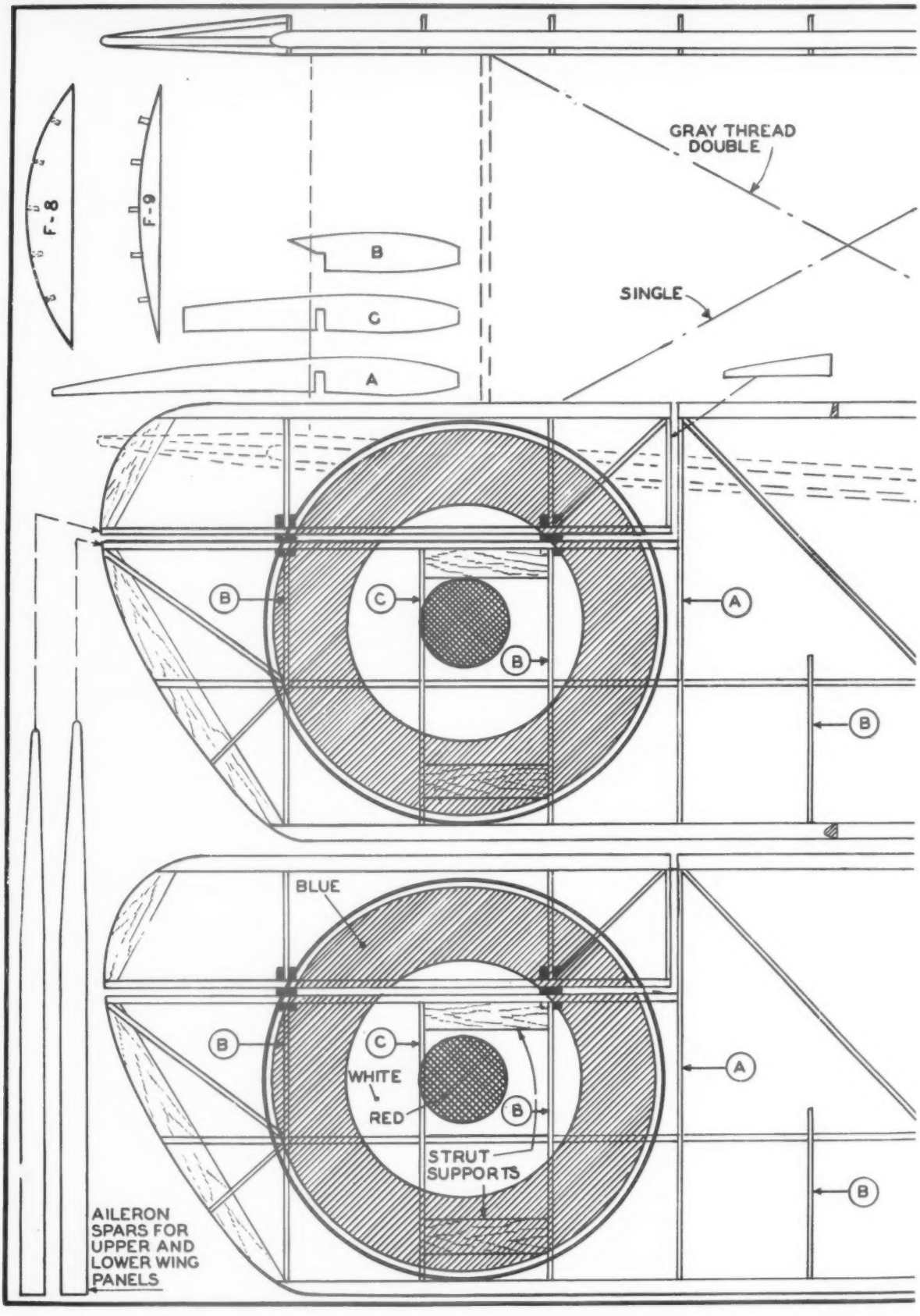
CRANKCASE

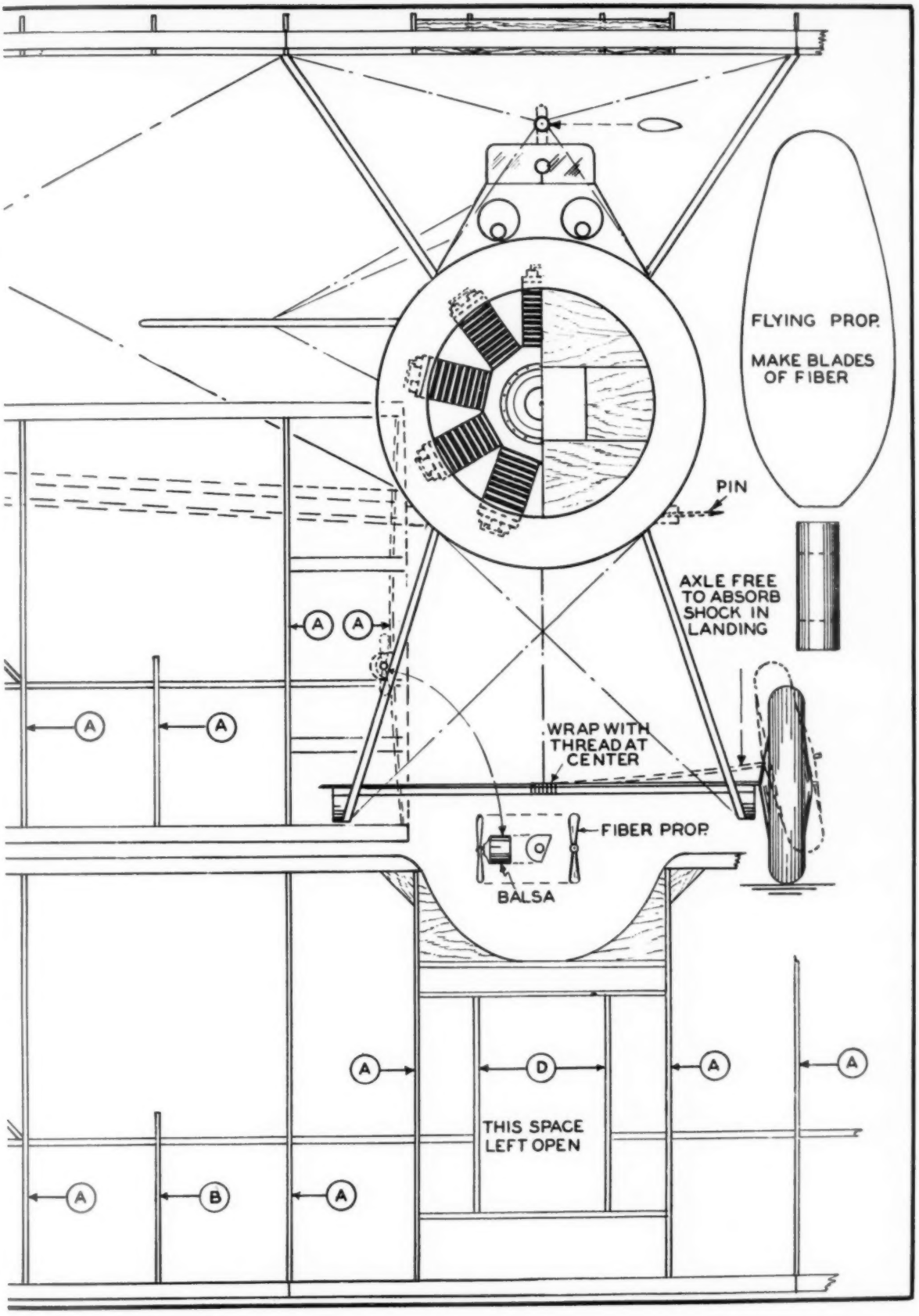
This is built from several pieces of balsa. See sectional view on plan.

(*Concluded on page* 114)


F - 3
RED COWL
F-3
PAINT WHITE
F-1
F-2
F-4
F-5
STIFF PAPER
LACING DRAWN IN WITH WHITE INK ON RIGHT SIDE ONLY
STIFF PAPER
BALSA PAPER
CEMENT TO F-3
ALUM. FASTENER
F - 1
F-11
F-11
F- 10
INSPECTION PLATE 2 REQ. MADE FROM STIFF PAPER CEMENT ONE TO EITHER SIDE
BUILD CYLINDERS AS SHOWN 9 REQ.
WRAP PAPER AROUND BALSA DISKS TO FORM CYLINDER
BALSA
F-8
F-9
LOWER WING SUPPORTS
B


BUTT JOINTS
F-4
F-5
F-6
F-7
F-2
POSITION OF 1/32 X 1/16 STRINGERS SHOWN ON FORMERS
F-6
FIBER
F-7
THE SOPWITH AVIATION COMPANY LTD KINGSTON-ON-THAMES
N-40171
N-40171
LIFT HERE
LIFT HERE
BLUE WHITE RED
DRAW IN WITH PEN AND WHITE INK
THIS SPACE LEFT UNCOVERED BOTH SIDES FOR INSTALLATION OF RUBBER MOTOR
STEP
MACHINE GUN
SCALE PROP
ELEVATOR HORN
GUN SIGHT
ALUM HINGE
FRONT WING STRUT
TOP
REAR WING STRUT
TOP
BRITISH
SOPWITH CAMEL
F-1
SCALE 3/4" = 1'-0"


F-8
F-9
B
C
A
GRAY THREAD
DOUBLE
SINGLE
B
C
A
B
B
BLUE
B
C
WHITE
RED
B
A
STRUT
SUPPORTS
B
AILERON
SPARS FOR
UPPER AND
LOWER WING
PANELS


FLYING PROP.
MAKE BLADES OF FIBER
PIN
AXLE FREE TO ABSORB SHOCK IN LANDING
WRAP WITH THREAD AT CENTER
FIBER PROP.
BALSA
A
A
A
A
A
A
D
A
A
THIS SPACE LEFT OPEN
A
B
A

Making a Model Shipboard Catapult

by ARNOLD PEARSON

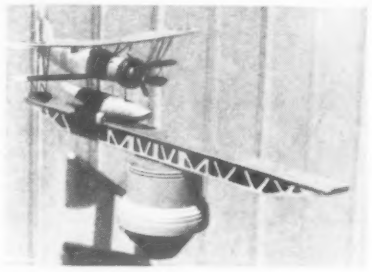
HERE is a model catapult, though not strictly to scale, which provides an effective mounting for a model seaplane of the Vought and Berliner-Joyce types. These are single-float seaplanes used on ships of the Navy which are provided with catapults. The dimensions in the drawing are for a catapult for a seaplane of a scale ¼"=1'. The dimensions may be changed for a seaplane of different scale.

The complete unit is made of pine throughout. The catapult itself is made to the shape shown in the drawing. Note that the top edge overhangs 1/16". This may be cut with a rabbet plane or a separate piece may be glued on for the top.

The pedestal is best turned on a lathe. If no lathe is available simply cut out a disc 3" in diameter and 1" thick for the pedestal. The bracket is made of ⅝" pine. The two holes drilled in the widest portion are for fastening the bracket to a wall.

The carriage is made to the general dimensions shown. The bottom should be shaped so that it slides freely on the catapult. The top is shaped to fit the bottom of the float of the model seaplane.

The catapult is fastened to the pedestal by a long machine screw which turns freely on the pedestal thus allowing the catapult to swivel. The pedestal is fastened to the bracket by four dowel pins. Before permanently assembling the parts however, they should be painted. Give all parts two coats of gray enamel. Then the top of the catapult, bracket, and pedestal are painted buff. The sides of the catapult are painted black to represent the girder construction as shown in the drawing.

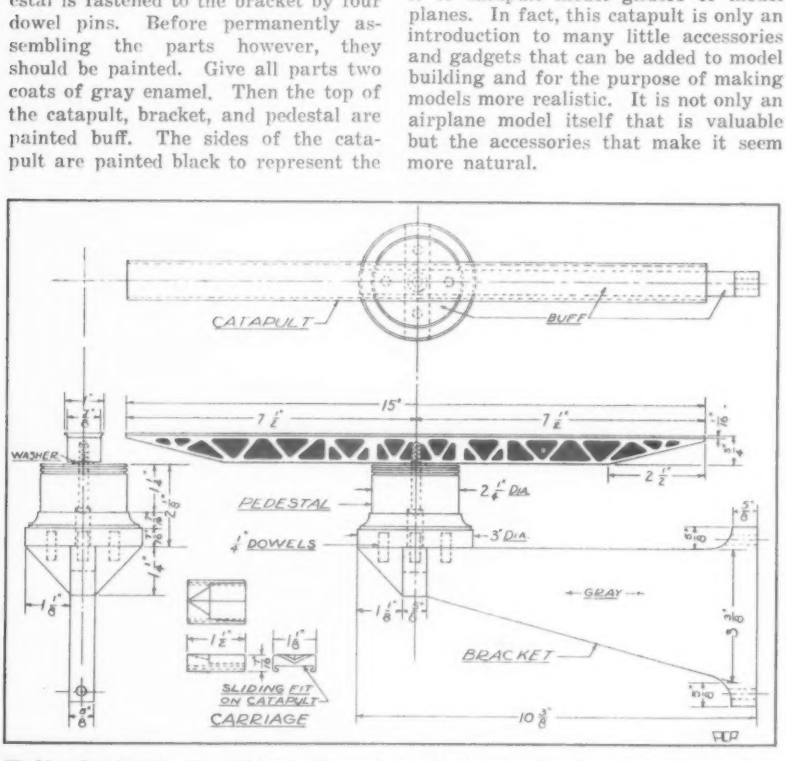


Here is the completed catapult with a model plane in position.

Fasten the model to the carriage with a small wood screw. Assemble all the parts together now and fasten the bracket to the wall. The model may slide along the catapult to any desired position.

On a much smaller scale, this catapult might prove a very attractive addition to the model battleships now being built by many of our model builders. The catapult truss could be mounted on a turret or deck of the model battleship and would greatly add to the realism of the model.

Or, we might get into the realm of practicability, and with a greatly enlarged catapult model, fully equip it with rubber bands or weights and use it to catapult model gliders or model planes. In fact, this catapult is only an introduction to many little accessories and gadgets that can be added to model building and for the purpose of making models more realistic. It is not only an airplane model itself that is valuable but the accessories that make it seem more natural.



Working drawings for the model catapult complete with the mounting bracket as described above.

Sopwith Camel

(*Continued from page* 109)

COVERING THE MODEL

Apply tissue to the various framework members, using a light grade of model airplane dope to fasten it to the outer edges. Stretch tissue as tightly as possible to remove all wrinkles. When edges have dried, apply coat of water to tissue. When all water has dried completely, tissue will become taut. May we suggest that you pin wings, elevator and such upon a flat surface to keep from warping.

FINAL ASSEMBLY

After all struts, etc., have been cut to size, you can assemble the wings to the fuselage. Next, install elevator and rudder. Grey thread is used for all bracing and flying wires. Force needle and thread through trusts, and hold thread in position with drop of cement. Other small details are clearly explained on plan.

TESTING AND FLYING THE MODEL

Use 6 strands of ⅛-inch flat rubber and attach flying propeller to nose. To test proper gliding angle, gently launch model over tall grass. Add weight to nose until the model will glide on an even angle. You can now wind the propeller for a test flight. Any adjustments regarding the flight of the model can be made through the use of movable control surfaces.

END.

Even the Transport Pilots Have Them

YOU can't fly the same route seven years without having some peculiar experiences.

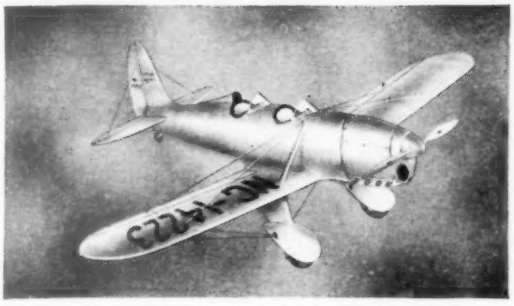
R. L. "Bud" Baker, Chief Pilot of Pennsylvania Airlines, Edward Couples and Lowell V. Scroggins, all of whom have flown more than seven years each for Pennsylvania Airlines, were recalling their experiences.

"Bud," whose hobby is farming, recalled his most humiliating experience. He was "hung up" in Washington, through some schedule change, and he wanted to be back on his farm near Cleveland where he could work on his day off, so he decided to "deadhead" back home.

He was in a holiday mood, because the pilot up front was doing all the work and he was riding comfortably back with the passengers. They noted his uniform and four bars on his sleeve which denote his long service. They also noted the bag of peanuts, another evidence of the holiday mood in which he found himself.

The miles went by, with Bud recognizing fence-posts, animals, trees, threshing machines and all the little details he had learned to see and know in flying the same route 1,500 times, and everybody enjoyed the flight. Everybody, that is, but Bud.

He became air-sick. The passengers grinned.



RYAN ST Wingspan 22½", length 16½", Wt. 2½ oz., scale ¾". Complete kit postpaid... **$1.50**
Ryan has dual control system which operates in either cockpit; adjustable wing flaps; plans for making an actual working engine—4 cylinders with movable pistons, carburetor and spark plugs.

THE NEW IDEAL SUPER-DETAIL LINE

With the Most Sensational Advances Ever Built Into Model Planes

In no other plane at any price can you get these unusual advances—the tested, proved features—the high quality and recognized authenticity of IDEAL super-detail models.

IDEAL planes are quality planes first, last and all the time because they are built up to the highest standard of perfection—never down to a price. They are designed by men who really know planes—men who know what you want. Men who know how to design and build planes that are absolutely authentic, exact in scale and guaranteed to fly.

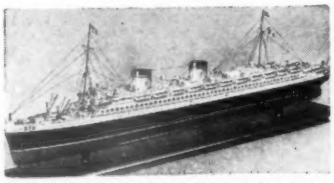
When you read about the many new features which are included in the new super-detail line; when you read about the many advantages that are exclusive with IDEAL; when you send for your IDEAL catalogue and see for yourself all the features which are included, you, too, will realize that no other plane can compare with an IDEAL Super-Detail Model.

That is why experienced model builders, fellows who have built all types of planes prefer IDEAL. We have many letters on file from boys all over the country which stand back of that statement. Let IDEAL prove its superiority to you. See your dealer, or send the coupon.

SEND 5c FOR ILLUSTRATED CATALOGUE
IT CONTAINS COMPLETE AND INTERESTING INFORMATION

Now is the time to get acquainted with the many new features—the real value that is built into IDEAL super-detail kits. Send 5c today for the colored, illustrated catalogue that shows the latest model planes and boats. This catalogue contains also complete and valuable information on how you can make real money by building and selling these famous flying models.

Build the NEW Super-Detail model Italian liner REX.



29"—scale 1/32" to the foot. Patented Hull Design

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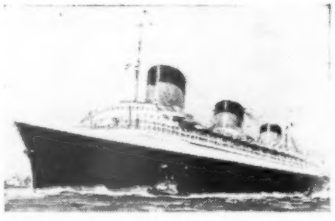
Kit complete, postpaid... $6.00



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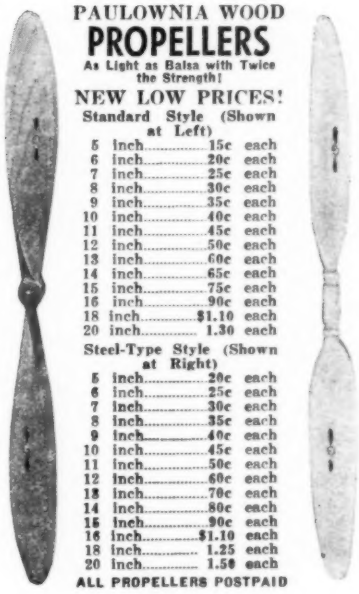

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18	inch	$1.10 each
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XUM

de Seversky

(*Continued from page* 88)

Russian Bear. The break was near. At home, growing discontent of the people was about to plunge the nation into a spasm of violence, revolution and anarchy the like of which the world had never seen.

This perilous situation found de Seversky still a soldier, on the Riga front. Neither he nor his comrades knew whence came the greater danger—from the front or from the rear. It was a tragic and hopeless position. A loyal, incapably managed army was resolutely standing its ground to the last ditch and at this last stand before the sauve-qui-peut rout of the grand armies of the Czar, de Seversky witnessed scenes comparable only to the great retreat of Napoleon from Moscow.

He witnessed, from the air, the German envelopment of Riga!

He was alone upstairs. His division commander had warned him to stay on the ground lest he be caught in the horde of enemy aircraft darkening the skies. The main objective of the German air raiders was Libau, 100 miles down the coast from Tzerel. He watched from his cockpit the great German fleet steaming toward the doomed Riga. It was a repetition of the capture of Port Arthur only a decade before. He was watching one of the greatest combined army and navy movements ever executed in the history of warfare. It must have been with indescribable feelings that he watched step by step the strategy that sounded the death tocsin of a nation.

De Seversky set himself down on a shell-torn landing field. Even as high explosives directed by the world's greatest artillerists diabolically found the field's range, de Seversky and five remaining pilots shoved off. Later, separated from his command and lost in a blinding, drenching rainstorm, the young officer was forced down.

He fell into the hands of revolutionary peasants. They began to jostle him—a man who wore his country's uniform. At the first push of a horny-handed farmer, de Seversky toppled over. Amazed at the sudden fall, the mob hesitated. The officer struggled to his feet. In a quiet voice, he informed his inquisitors that he was possessed of only one leg—hence his easy fall. The effect produced was extraordinary. All present had heard of the "great one-legged pilot." He had been a hero to them. He was yet. So this was he! Not just an officer of a Czar who kept them in serfdom.

Thus, although "loyal" now to a new "government," the mob fed and clothed the luckless aviator and arranged his passage through enemy territory. He was taken on a journey that resembled the Underground Railway of an earlier America.

It was during this Riga campaign that de Seversky completed an invention that was not only to prove highly valuable to his country at the time, but was destined to be one of the most modern developments of a latter day flying world.

At that time it was impossible for the bombing squadrons to carry out their missions, heavily loaded with bombs, without sacrificing some of the weight ordinarily accounted for in the fuel supply. A 200-mile round trip was almost impossible. And pursuit ships could not carry enough gas to protect the bombers. De Seversky rigged up special fuel carriers which took off after the bombers. When the latter were returning, just about out of gas, the carriers hove to overhead, dropped their hoses and filled the empty tanks.

Although he was already known for his inventive genius, de Seversky had plenty of opposition to this simple plan. It was called "unsound and impractical." Aviation chiefs were reluctant to give permission for this "foolish experiment," but they didn't forbid it although they warned him he was wasting his time. Yet it is virtually the same method used today!

With an official record of 12 enemy planes destroyed in combat, de Seversky presented himself to Alexander Kerensky who had formed a new government. He found his deeds already known and received the Order of St. George which automatically promoted its holder to the naval rank of Commander.

A naval commander at the age of 23!

He plunged into his new duties with the government with characteristic vigor. He saw all about him the ravages of a revolution that shook the civilized world. What might have happened to him, however, had he remained in Russia is largely a matter of conjecture. But it is almost certain that his first chance to distinguish himself proved to be a very lucky break indeed. It took him from Russia to America.

De Seversky was appointed vice chairman of the Russian Naval Aviation Commission to the United States and proceeded to this country in March, 1918. While in Washington, he was made an assistant in the embassy to act as Naval Attache in charge of aviation matters. It was a post well suited to him and had the additional virtue of bringing him in contact with the most important aeronautical figures in the nation's capital.

Then the embassy was closed. The United States could not or would not recognize the existing disordered government in Russia. De Seversky was at a loose end. But not for long.

He volunteered his services and experience to the army air service and was accepted as an inspector of battle planes in the Buffalo manufacturing district. It was his first official connection with the American army. This is an understatement. It should be stated that it was the first of a long series of connections with the army which have obtained through 17 years. De Seversky showed the War Department his ideas of an automatic bomb sighting device—something of an improvement over those he had placed on Russian naval ships. Inventors would probably be interested in knowing that he received $50,000 for the device.

The inventor was now, in addition to being honored by the United States

(*Concluded on page* 132)

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A steady stream of congratulatory letters from all over the country pay tribute to SELLEY-TEX CONSTRUCTION SETS—the greatest advancement in the history of model building. To all of you who experienced the grief associated with the sad task of assembling a Balsa Stick Kit, here is a challenge! TRY a SELLEY-TEX Construction Set! If you do not find it to be the easiest, most practical method of building an authentic, true-to-scale model airplane, simply return it in good condition and your money will be refunded in full! So strong a GUARANTEE of superiority must represent extraordinary value. Order one today and judge for yourself!

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I believe you have something that will make the Model World sit up and take notice. You are about ten years in ADVANCE of all other model companies and have beaten a path for the rest to follow. You have really CONTRIBUTED a worthwhile thing to us modelers and I as one feel duly grateful. Lots of luck.

(Signed) Homer D. Corwin, Bismark, N. Dak.

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WACO D MILITARY. A wealth of military detail characterizes this formidable prototype of the latest Army innovation, and what a flyer!

The SELLEY-TEX moulded parts included in this kit are shown at the right. These together with special parts and materials as listed complete this outstanding value.

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LISTED PARTS AND ACCESSORIES

Finished scale flying, adjustable pitch metal prop, finished propeller shaft and rear hook, scaled wheels, with brass bushings, ribs printed out accurately on white sheet balsa, many special turned wood parts, finest grade of balsa wood, sticks, tail wheel and fork fittings, control horns and wire, pure para rubber, special bamboo paper, authentic markings, colored insignia, best quality cement, colored dopes, full size easy-to-understand plan, complete with all picture details. All the tools necessary to build model, such as

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The SELLY-TEX moulded parts included in this kit are as follows: Fuselage, balancing ring, nose piece, spinner, head rest, rudder fairing and combination pants and landing gear; these together with special parts and materials as listed complete this outstanding value.

GOSHAWK 4.00

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GOSHAWK. A powerfully attractive flying scale replica of the speedy Navy fighter and accurate to the minutest detail.

The following SELLEY-TEX moulded parts: Fully detailed fuselage, bulkhead, head rest, balancing ring, drag ring, bombs, belly tank, wheel shoes, shoe fairing, tail wheel fairing and a special fully scaled 9-cylinder motor, detailed with push rods, all the fine scale parts and materials as listed complete this very extraordinary value!

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The SELLEY-TEX moulded parts include fuselage sides, bulkhead, balancing ring, head rest, wheel fairing and tail-wheel fairing, special scaled 9-cylinder radial motor detailed with push rods and a drag ring. Also the many special parts and materials as listed come in every SELLEY-TEX kit. WHAT A VALUE!

FREE! Write for our beautiful, two-colored broadside containing illustrations and details about the new SELLEY line of incomparable SELLEY-TEX Construction sets. Send 3c stamp for postage.

DEALERS!

Cash in on the growing demand! Write for discounts, propaganda, etc.

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WACO C CABIN. A masterpiece of authentic model design, incorporating every scientific feature to insure maximum flying performance.

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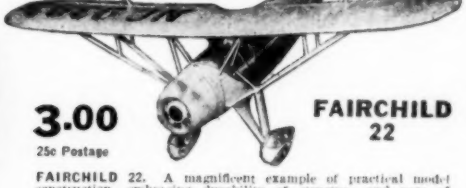

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FAIRCHILD 22

FAIRCHILD 22. A magnificent example of practical model construction, embracing durability of structure and ease of performance.

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29 in all. Identically same as the ¾" line—except smaller, and Kits contain NO LIQUIDS. If ordering less than 6 by mail, 10c PER Kit must be added to these prices to cover handling charges.

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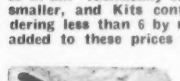
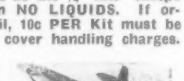


14⅛" Boe. P-26, 65c



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so go there first. If he hasn't, order direct, giving his name and type store (hardware, sporting goods, department, etc.). Send check or M. O.—no C. O. D.'s. Canada, Mexico, British Isles, add 10% to all prices; other countries, 20%.

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MODEL & SUPPLY CO., INC.

1866PAH West 57th St., Cleveland, Ohio, U. S. A.

Airy Chat

(*Continued from page 74*)

.hat is delaying the progress of avia-..on. What about a new deal?

* * *

BISHOP, one of the World's greatest wartime pilots, has never been given the attention that he so richly deserves. In this issue, Carl B. Ogilvie has prepared a very comprehensive biography of England's great ace that we know will be of great interest to you. I advise you to read this authentic account of true valor.

* * *

ARTIST BOLLIN is a believer in an intensive development for the U. S. Army Air Corps. He says that unless the Air Corps get some new ships in a hurry that he will run out of military subjects for the front cover. The Air Corps is, therefore, notified to hurry along with their developments if for no other reason than to keep our front cover going.

* * *

THERE is another "mystery" ship afloat. Every summer brings at least one of these eye-openers, but we believe that the present surprise package has something in it. It is reputed to have a top speed of 390 miles per hour and a climb of 2,000 feet per minute. If this is true, then we'll really have something to talk about in a future issue. According to the dope received so far, this latest military speed marvel has a new type engine of the two-cycle order.

* * *

A NEW engine has just been put into production by an English concern that weighs only one pound per horsepower or, more correctly, 1.08 pound per horsepower. This is in no way a freak nor a special racing job, just an everyday service engine that has been developed by an old and reliable company, and intended for military or commercial service. This is certainly peeling the weight off with a vengeance and speaks well for modern materials and the art of the modern metallurgist.

* * *

SPEAKING of metallurgists, makes me think of the man who is really responsible for the greater part of automotive progress. He is a man that the general public seldom hears of but he has made more progress during the past decade than all of the other engineering branches combined. Folks, meet Mr. Metallurgist, the man who originates all of the new and powerful alloy steels, the light but strong aluminum alloys and all the other metals that speak for strength, endurance and light weight.

If it were not for modern metallurgy, we could have no reliable airplane engines, all-metal planes nor automobiles. Any superiority that can be claimed for modern automotive vehicles is not so much due to design as to the improvement in materials that has been made the last few years.

I remember well when automobiles had rear axles of cold-rolled shafting, sometimes more than two inches in diameter and they were always snapping off at that. Now we have chrome-nickel and similar steel axles of only a fraction of the original size and yet proof against all the shocks and loads that we can give them.

* * *

HOW many of you have heard of a Heat Treater? Very few, I should imagine, yet if it were not for this important personage our aero engines would have mighty poor crankshafts, camshafts and other high duty parts. He takes a steel part, heats it to just a certain temperature, quenches it, reheats it and so on until the steel has reached its maximum of strength and endurance.

* * *

OWING to a misplaced tabline, Lieut. H. Latane Lewis, II, was given credit for the authorship of "Test Pilots and Their Jobs," appearing in the May issue. The real author of this article was John C. A. Watkins.

* * *

WE seem to be rather shy on air-races this year. The promoters are having a tough time raising money for these affairs. Up to the time this is being written, we've had definite news of only one big league meet of consequence. At this time in other years, the big shows were playing all three rings.

* * *

WE HAVE had repeated inquiries for the address of Wiley Post. If this gentleman wishes a big package of correspondence on his hands, all he has to do is to slip us his address.

* * *

JUST a word to our authors. Please put your name and address on your manuscript as well as upon the letter that accompanies it. Sometimes the letter gets separated from the manuscript and then the fun begins. This will take only a little of your time and it will save us hours of grief. Thanks.

* * *

WE have had Ford engines, Chevvy engines, British-American engines, copper-jacketed Cadillacs and all sorts of automobile engines on airplanes, but now comes the Plymo-Coupe equipped with a Plymouth engine. We haven't heard from a plane with a Terraplane engine (which wouldn't be a bad bet, by the way) nor with a Studebaker engine or a Lincoln. Come on fellows, there still are a few cars that you haven't stripped yet.

* * *

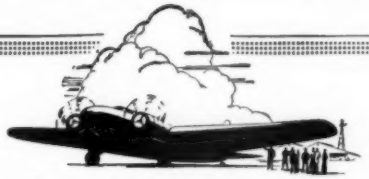
TEN of our readers wrote in last month asking us about the Aviation Brotherhood of the World, an organization reputed to be in a position to stop future wars by the aid of the airplane, providing they had enough members that would slip them ten bucks for a membership. No, I am glad that I don't know the address.

* * *

So long; until next month.

J. B. R.

Boeing School frankly answers 7 questions you should ask of any school you are considering



1. Has the school a "playboy flying school" reputation — or is it known for long hours of intensive, serious work?

Any graduate will tell you that only men willing to work hard, 7 to 7½ hours a day, 5 days a week, should consider Boeing.

2. What equipment will I *actually* work with — in terms of school-owned ships (and their actual horsepower), technical library, laboratories and shops?

Boeing provides nine different types of ships, even the primary training planes are heavier and of higher horsepower (165 h.p. to 210 h.p.) than those in use at certain other schools. Advanced flight training is given in transport-type ships of up to 1350 horsepower. And in every shop at Boeing you use only standard equipment — so you'll be properly experienced when you get out in the aviation industry itself.

3. Who are the men I will *actually* study under?

Boeing is widely famed for its teaching staff . . . 18 full-time instructors chosen on the basis of long experience with military, air mail, commercial and technical problems — and their ability to impart their highly specialized knowledge to others.

4. Is school affiliated with an airline?

Boeing School is a division of United Air Lines Transport Corporation, which *flies more passengers, more planes, more mail, more miles, than any other line in the world.* Can you think of any school as well equipped to prepare you for a career in aviation?

5. What are its graduates doing?

Boeing graduates are today going ahead as: scheduled air transport pilots, co-pilots, test pilots, sales pilots, field traffic men, traffic representatives, airplane mechanics, aircraft engine mechanics, hangar and field service mechanics, metals mechanics, factory workers, radio operators, radio technicians, dispatchers, instruments mechanics, instrument technicians, field secretaries, field managers, aeronautical engineers, in the employ of many leading companies.

6. How does the U. S. Government rate the school?

Boeing is rated as an *Approved School* by the U. S. Department of Commerce, and approved by the U. S. Immigration Bureau for training foreign students. Its shops, furthermore, are listed a Department of Commerce *Approved Repair Station.*

7. Does it seek students by promising "to place graduates"; or are they attracted by the type of training that gives a definite edge in the competition for jobs?

Boeing makes no promises of finding its graduates jobs. It is a fact, nevertheless, that the industry absorbed 84% as many Boeing graduates in 1933 and 1934 as the total number graduated by Boeing during those two years.

Write for further information

Every serious-minded young man should see that he gets the answers to these seven questions from every school he is considering.

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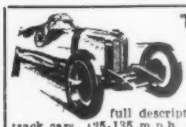

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Coast Guard

(*Continued from page* 82)

Into this gigantic peace-time endeavor will be flung the twenty-five authorized planes to comprize a squadron which will give full-grown flight to the life saving air corps.

The operation of two Coast Guard planes at the Gloucester Base during the spring of 1932 as revealed by government records exemplifies the work done by the flying boats and their pilots. New England coast weather conditions in the spring have given it a reputation for poor flying country.

But the record shows that one plane, a Loening amphibian, powered with an inverted Liberty motor, made twenty-five flights, cruised 3,753 miles during fifty-five hours in the air with no forced landings and no time out of commission. The other, a Vought Corsair, with a Wright radial motor, made thirty-five flights, cruising 3,640 miles in fifty-one hours of air duty with no forced landings and no time out of commission. Practical? It's in the record.

During this period the two planes were housed in a temporary hangar with no proper facilities for housing and upkeep, but nevertheless made sixty flights, totalling 107 hours in the air, and patrolling an area of 47,000 square miles.

A typical case of rescue and aid given by the Coast Guard airmen occurred on August 15, 1932. A fisherman contracted blood poisoning while on a schooner sailing 175 miles east of Nantucket Island, Mass. The schooner's master called for aid, saying the man's condition was critical. The Gloucester Coast Guard air base picked up the call and immediately the Sirius, a Douglas Amphibian, left in the dark of the night.

Constantly in touch with surface patrols, the plane searched through the darkness among the fishing fleet on George's Bank until its gas supply was nearly exhausted. It waited too long and was forced down off the coast near Matinicus Rock. The seaplane Altair, on a test flight off Cape May, picked up the report that the Sirius was down. In the afternoon of the following day the Altair found the Sirius, which had in the meantime signalled the Coast Guard Destroyer Wainwright and with daylight at hand located the schooner with the sick man aboard. He was promptly transported to shore and relief.

Most of the heroic work done by Coast Guard pilots and crews has been accomplished under the severest of weather conditions and with the most meager of facilities. Now, with the additional forces and stations materializing, the service record should gain new heights of accomplishment.

It is appropriate that the Federal Government at last recognizes the work and needs of the Coast Guard. Through its antecedent, the United States Revenue Cutter Service, it is one of the oldest sea organizations under the government's jurisdiction.

After the Revolution, the Continental Navy was disbanded. There was then no sea force available for protection of the Atlantic coast and the maritime interests of the newly born United State until the organization of the Revenue Cutter Service by Congress in 1790. This force was alone in its protection duties until the Navy was organized some years later.

An Act of Congress, approved January 28, 1915, combined the then existing Cutter Service and the Life Saving Service, thus creating the Coast Guard. With this impetus, the Coast Guard began to grow, and the visions of flying boats came.

So now it won't be long until powerful flying boats, roaring away from ten air bases, ranged along the United States Coast, will wing their way on innumerable errands of mercy, through all kinds of weather, day and night. Big boats for big jobs, courageous pilots for hard jobs.

The Coast Guard's motto, "Semper Paratus" — "Always Ready" — has wings!

END.

Camel

(*Continued from page* 91)

destroyed by a lighter-launched Camel. It was brought down in flames on August 11, 1918 off Ameland Isle by Lieutenant S. D. Culley.

In all dimensions the 2F1 was like the 1F1. In appearance it differed slightly. In the 2F1 the hump forward of the cockpit was smoothed to a long slope down to the motor cowl from which only one Vickers gun protruded. Another gun, a Lewis, was mounted on a lattice work frame through the slot in the upper wing. This gun could be moved to point at any angle. The reason for this is apparent: the 2F1 was intended for combating large aircraft and this mounting of the Lewis dispensed with the necessity of hanging by its prop under the belly of the Zeppelin or bombing plane.

Either the 150 h.p. Bentley Rotary 1 or the A. R. Rotary 1 could be used. The Bentley seemed the more popular of the two, and was used on the majority of 2F1's.

The 2F1 was trickier to fly than the 1F1, but the performance merited the added strain. The maximum speed of the Bentley Camel was 121 m.p.h. at 10,000 feet and 114.5 m.p h. at 15,000 feet. The time required to reach 10,000 feet was 8.3 minutes and the landing speed was 38 m.p.h.

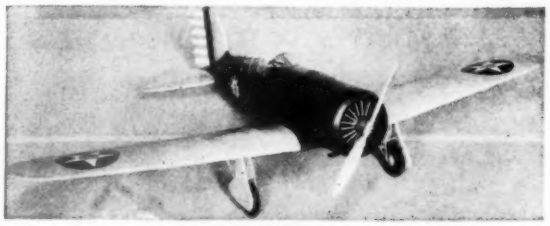
When the merits of the machine were tallied at the end of the war, the Camel had destroyed a total of 1,281 enemy airplanes, one Zeppelin and an untallied number of sausage balloons. This score was won on the Western Front over the North Sea, the Engiish Channel, and on the Italian Front.

NEW CURTISS F11C4 NAVY PURSUIT

28" Span, Length 20½", Weight 4 oz., 1" Scale

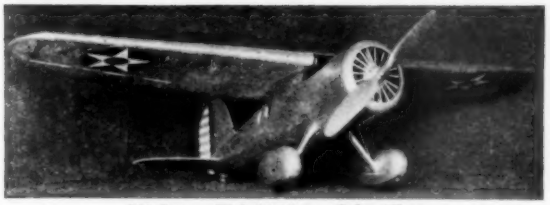
THE MOST EXCLUSIVE AND FINEST EQUIPPED MODEL IN THE WORLD
A special De Luxe model, one of the most beautiful and finely detailed ever made, with its special exact scale 3¾" celluloid, 700 H.P. type, Wright Cyclone motor, having aluminum push rods, cylinder fins, etc., like real motor. Also in set are 4" aluminum cowl ring, 9" carved spruce semi-scale flying propeller, colored star and rudder insignia, 2" celluloid balloon wheels, silver dope, paint, black, red striping, Navy lettering, wire parts formed, axles, rubber motor, windshield, instrument board, flying wires, 4 aluminum step plates, aluminum wing walks, ready cut wheel pants, etc. All other parts printed on balsa. Detail scale drawing.
Construction Set Complete, postpaid **$4.50**

NEW LOCKHEED P23 ARMY PURSUIT



32" Span, Length 22½", Weight 3¼ oz., ¾" Scale Model
One of the most outstanding values in models; it has excellent lifting power, rising from land or water in a few feet. From the latest Army land plane it is convertible into Lindbergh's seaplane by attaching the floats. Construction set contains: formers, ribs, all other parts printed on balsa, 3⅜" turned cowl front, celluloid wheels, axles, colored insignias, U. S. Army lettering, semi-scale propeller, yellow and drab dope, glue, 33"x44" full scale drawing, etc.
Construction Set Complete, postpaid, Landplane **$2.50**
Seaplane Set. Same as above with printed float parts, stringers, dope, etc. Drawing shows float attachment and design.
Combination Land and Seaplane Set, postpaid **$2.95**

LOCKHEED ARMY SPEED VEGA

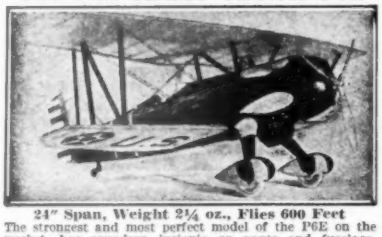


50" Span. Weight 14 oz. Color Silver
A new sensational flying scale model. Rises from ground in 15 feet and makes long steady flights. Const. set contains all formers and wing ribs cut out and notched for stringers, spars, etc., wheel pants ready cut, 3" turned balsa wheels, 5¾" turned balsa cowl front, 15" carved varnished steel type propeller shown, 5 oz. silver paint, glue, etc. Even an amateur can make a perfect model of this with ease.
Const. set postpaid **$8.50**

NEW BOEING F4B4 NAVY FIGHTER

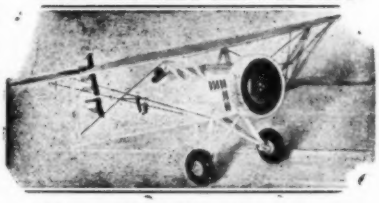
22½" Span, Length 14½", Weight 2½ oz., Color, Silver and Yellow
New improved model exclusively equipped with new 3¼" special aluminum streamline tapered cowl ring, 9 cylinder celluloid motor with aluminum ventilator front, 8" carved varnished propeller, printed out balsa wood parts, silver dope, paper cement, glue, formed wire parts, celluloid wheels, tail wheel, U. S. Navy lettering, colored insignia and ¾" scale drawing. **Construction Set Complete, postpaid** **$2.95**

CURTISS ARMY HAWK P6E



24" Span, Weight 2¼ oz., Flies 600 Feet
The strongest and most perfect model of the P6E on the market, has squadron insignia on pants and fuselage, metal exhaust pipes, aluminum wheels, 2 color dopes, all parts printed on balsa, printed instrument board, 8" carved propeller.
Construction Set Complete, postpaid **$2.50**

CURTISS SEA HAWK P3A



24" Span, Weight 2¼ oz., Flies 700 Feet
Set includes 3" celluloid motor, aluminum motor plate, 3" drag ring, balloon celluloid wheels, printed instrument board, fuselage, wing and rudder insignia, 2 oz. silver dope, glue, etc. 8" carved Paulownia wood prop. All parts printed on balsa. Full size drawing and all parts. **Set postpaid** **$2.75**

NEW CURTISS HAWK F6C3

U. S. Navy Fighter

20" Span, Weight 1¾ oz.
This new plane is used extensively by U. S. Marines.
A scale model of one of the late Navy Hawks. Set includes all parts printed on balsa, colored insignias, 1⅛" celluloid wheels, lettering, silver dope, cement, glue, detail drawing and all parts to build as shown.
Construction Set, postpaid **$1.50**

BOEING F4B4 NAVY PURSUIT

1/5 H.P. Gasoline Motor Driven Model

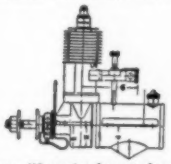
68" Span, Length 44", Color Silver
This is not just an ordinary large model, but one specially designed and engineered to stand the strain of the gas motor.
An exact scale model 1/5 the size of the real large plane rated as the finest biplane fighter in the U. S. Navy. This is the most realistic and life-like model of this size ever produced. As all the fuselage formers, wing ribs, tips, etc., are all cut out and notched for stringers, spars, etc., even a novice can make a perfect model of it with ease. Set contains 6" turned balsa wheels with bearings, rubber tail wheel, a special turned balsa 10" speed, cowl ring used on the latest Boeings, silk covering material, silver and red dope, glue, full size scale drawing, axles; all wood cut to size, etc. Weight of model with motor 3½ lbs.
Construction Set Complete, without motor, postpaid **$25.00**

NEW 1935 CATALOG—Send 3c Stamp

You will find this the most interesting catalog on scale flying rubber and gas motor driven models ever published. Beautifully illustrated, size 8" x 10". Also gas motors, supplies, 36" Gar Wood speed boat, electric or gas motor driven.

1/5 H.P. Gasoline Model Motor

Weight As Shown 8 oz.



Long life motor has steel cylinder and piston, ⅞" bore x 1" stroke. Comes complete with gas tank, coil, condenser, batteries. Price ready to run, complete, postpaid, only..... **$22.50**
15" or 19" laminated prop. for motor..... **$2.75**

Northrop FTI Navy Fighter

22" Span, Weight 2 oz., Color Silver, ¾" Scale
Exact scale model of the Navy's latest 272 m.p.h. fighter. Set includes all parts printed on balsa, 3" turned cowl front, colored insignia, lettering, 2 oz. silver dope, ¼ oz. black, 1 oz. paper cement, 1 oz. glue, 7" fibre propeller, axles, windshields, bearing button with bearing, full size detail drawing, formed wire parts.
Construction Set Complete, postpaid **$2.00**

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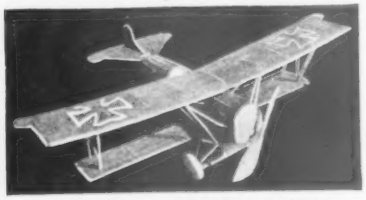

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1/16x1/16.....100 for 5c
1/16x1/8.....35 for 5c
1/8x1/8.....30 for 5c
1/8x1/4.....10 for 5c
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1/32 and 1/16x2 8 for 10c
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1 doz., all colors, AA 19c

SILVER TISSUE
20"x24".....each 5c

SUPER-FINE TISSUE
White Only
Sheet, 5c; dozen 50c

BALSA WHEELS
½" ..... 3c ¾" 4c
1" ..... 5c 1¾" 7c
2" .....10c 3" 17c

DOWELS
1/16x6.....doz. 5c
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WIRE
2 ft. 1c. 25 ft. 10c

INSIGNIA SHEETS
24 and strips..... 5c

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1 doz. ⅛ and ¼..... 1c

PROPELLER BLOCKS
½x ¾x 6.....6 for 5c
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½" .....2c ¾" 3c
1" .....4c 1¾" 5c
2" 10c

SHEET ALUMINUM
005 in. thick, 15c sq. ft.
010 in. thick, 20c sq. ft.

CLEAR DOPE
1 oz.....5c ⅛ pt.....30c

FREE
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1 oz. bot. 5c; 2 oz. bot. 10c
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MACHINE-CUT PROPS.
5".....5c 6".....6c
7".....7c 8".....8c
10".....10c 12".....12c

BAMBOO
1/16x1/16x12....36 for 5c
1/16x¼x15,ea.1c; doz.10c

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Small, doz.....10c
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RUBBER
1/16x1/16.....18 ft. 5c
1/8 flat.....15 ft. 5c

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20x30.....1 for 10c

SHEET CELLULOID
6x8.....5c 12½x16....20c

CELLULOID WHEELS
¾"....pr. 5c 1¾"....pr. 10c
1" ....pr. 7c 1⅞"....pr. 17c

DUMMY RADIAL ENGINE
1¼" d. 18; 2" d. 23; 3" d. 33

ENGINE AND COWL ATTACHED
1½" dia. 20; 3" dia. 35

CELLULOID PANTS
½" to 1".....pair 18
1⅛" to 1⅞".....pair 33

ALUMINUM COWLINGS
1½" 15; 2" 18; 3" 25
Specify whether anti-drag, closed, or open.

BOMBS
¾" 04; 1¼" 07; 3" 12

GUNS WITH RING MOUNT
1¼" .....10; 1¾" 15

PURSUIT MACHINE GUNS
¾", 1¼", or 1¾" ea. 05

PROPELLERS

	2 blades	3 blades
1½"	.08	.10
2½"	.11	.15
3½"	.18	.20
4½"	.20	.25

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12", 10c; 15", 15c; 24", 20c.

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IMPERIAL MODEL AERO SUPPLY, Dept. A
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Bishop

(*Continued from page* 80)

In the face of death, Bishop proved more skilled at maneuvering a plane than the Baron. He skillfully avoided the murderous onslaught and zoomed to train his gun on the Baron as he overshot his prey. The Baron did a lightning turn and came head on at Bishop. Bishop got in a short burst at the onrushing Hun killer. Then the unexpected, which all too often spelled doom for pilots, occurred. Bishop's Lewis jammed!

The Canadian was forced to withdraw. Everywhere he turned was smoking with tracers, and lead showered into his ship. Nine Albatros surrounded him and his comrade. The Baron was quick to get on the defenseless Bishop's tail, pouring Spandau lead at him. In the center of this mad swirling cyclone of death, Bishop maneuvered for his life.

At that desperate moment, a flight of British naval triplanes came racing into the one-sided melee. The Baron and staffel quickly beat it for home and fireside.

Of this, the most harassing encounter Bishop ever experienced, he said: "Every circumstance was against us and the formation was made up of the best German pilots in the air. They fought under as favorable conditions as they could have wished and one can only wonder how they missed completely wiping us out."

Bishop was promoted to a captaincy and awarded the Military Cross. Six days later he was again honored by an appreciative government by being awarded the Distinguished Service Order.

BISHOP was no modern Bellerophon who bridled Pegasus with a golden bridle and flew his winged horse through the air to slay a fearful Chimera-like monster that breathed fire and destruction upon the Allied air forces.

He didn't jump from saddle to cockpit, hop the Channel and ride on the tails of German pilots to fame and glory. When the Canadian mounted riflemen heard "blacksmith shop" rumors that they were to lose their mounts to fight as bloomin' infantrymen in an infantry-man's war, Bishop applied for a transfer to the flying corps. In July, 1915, he was sent to the R. F. C. Completing instructions he went to France as an observer and from there to a hospital when an over-confident pilot attempted to maneuver to earth in a cross wind!

While in the base hospital Bishop firmly resolved that if any cracked-brain pilot was going to crash his bones *he* would be the pilot with that special privilege. He told Wing as much when he got out of the hospital. He was sent to England to receive pilot training.

When he completed the course of instruction, this Canadian, who had just come into man's estate of 21 years, received a set-back. Instead of being assigned to duty at the Front, Lieutenant Bishop was detailed to a Home Defense squadron. His blood boiled. He had come overseas to fight. Now he was a full-fledged pilot—assigned to chasing his shadow around the heavens on moonlit nights. Champing on the bit of impatience, Bishop flew on Zeppelin patrols until March, 1917, when he finally was assigned to active duty at the Front.

Lieutenant Bishop flew the British-made Nieuport, on which he won his first victory, across the Channel to Boulogne. There, he became a flying officer of the famous 54 Squadron, commanded by England's first Ace, Captain Albert Ball.

It was Captain Ball's orders to pull out of the fight that Bishop had disregarded. Ball, the Boy Ace, and Bishop, "the Arch-fighting Bishop," became an invincible duo of 54 Squadron. Ball, with his long list of forty-three victories, inspired Bishop to equal that total. Bishop had met in deadly combat, and emerged victorious against the best enemy pilots; he knew that he was a better pilot; that he was not lacking in courage, and that he trained his machine gun with deadly accuracy.

Self-confidence was the basis of his breathless recklessness. He positively believed that he would never be shot down. He knew there wasn't an enemy pilot who could fly well enough to shoot him down. And, if chance or luck should be with the other fellow, Bishop was positive of one thing—that he would die fighting rather than be taken prisoner. He made a solemn promise: "I will fight as long as there is an enemy in the sky."

On the ground, this dashing smartly uniformed Canadian possessed a cordial democratic manner and irresistible personality. He made friends easily and was considered "a good mixer." But in the air he was entirely too good a mixer for the Huns. He could dress his ship and align his sights quicker than any other pilot in the air at that time. It can hardly be said that the Huns liked him, but they did envy his flying skill and flew in fear of his deadly marksmanship. Bishop was Hell on wings. Very few jadgstaffel pilots who accepted his challenge to combat or strove to trap Bishop, lived to brag of their foolhardiness.

One of the most spectacular victories of the World War was Bishop's 47th victory. He had just smashed into a dog-fight and broke up a flight by getting his 46th Hun when he saw high above him a two-seater reconnaissance plane. Nosing up until his ship reached its absolute ceiling, he was chagrined that, at 19,500 feet, his plane began sinking off. His motor sputtered for oxygen and Bishop felt himself growing sluggish at the controls in the thin air.

Again, he tried to climb, but the Hun plane was still out of range of machine gun fire. Then Bishop thought of a

(*Concluded on page* 124)

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YESSIR! Be the envy of your friends! Send today for our New Giant Models, and build planes that are 1/3 the size of real passenger carrying planes. Each of these models is a strong outdoor flyer—a $10.00 value for only $1.00! Everything is in the kit INCLUDING ALL LIQUIDS—nothing else to buy! There is no catch! Over 10,000 of these models have been sold and built (proof of this in our files), and we have received highest praise from model builders for giving such tremendous values. Inspect our kits at any dealer or read for yourself what each kit contains. If you are not convinced that our kits are the biggest values, don't order. If you already realize what bargains our kits are, send your order today and in a few days you will be the owner of a beautiful flying scale model that will make you the envy of your schoolmates and neighborhood.

5 FT. STINSON RELIANT

5 FT. HEATH PARASOL

CONTENTS: Each of these new G. H. Q. Giant 5 ft. Model Planes contains full-size Plans, all ribs, formers and curved parts clearly printed on best grade Balsa. Large bottles Cement and Dope, different colors Japanese Tissue, Special Endurance Rubber, finished Ready-Cut 3" Wheels, Wire, Balsa strips cut to size, Washers and . . . Movable Controls, shock-proof Landing Gear, Scale Details, Lettering, Numbering and Insignias, Flight Log, etc.

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Bishop

(*Continued from page 122*)

clever bit of strategy—if only he could trick or force the reconnaissance ship down within range!

By sending bursts at the reconnaissance plane he forced the pilot to sideslip. In the thin air it required hundreds of feet for the enemy pilot to pull the heavy plane out of its slip. One long slip brought the plane down, but directly above Bishop. He was out of position. By the time Bishop could redress, the Hun would be climbing.

Brilliantly, the Canadian pulled back on the stick until his plane stood on its tail. A long burst into the belly of the German plane sent it down. And Bishop went swirling down for 2,000 feet before he recovered from that spectacular deadly stunt.

SHORTLY afterwards, Bishop was awarded the D.S.O. for the second time, promoted to rank of major and ordered to England to form his own squadron—Squadron 85. He returned to France flying at the head of his 19 plane formation of S.E.'s in a silver painted Bristol scout, a gift to Bishop by a general.

On June 6th, 1918, Bishop saw a bombing raid made on Squadron 84's 'drome, which was blown to smithereens. The Hun bombers flew over in the protecting darkness of night and laid thirty-two bombs on the British Handley-Page airdrome. It was the worst raid and most destructive Bishop had witnessed.

Amidst the roar of enemy motors overhead, a blinding parachute flare was dropped which lit up the hangars and landing field like day. Down came phosphorous bombs which set a hangar ablaze. A demolition bomb made a direct hit on a dugout, killing forty officers and men who had taken shelter for safety.

Bombs exploded with terrific detonations, tore great holes in the field. Then the Hun bombers raced safely away. When the Handley-Page bombers, which had also been out on a raid, returned they found their field so badly blown up that it was impossible to land on it. They were forced to land at nearby fields.

Bishop's reaction to this serious blow to the R.F.C. was to conceive the most daring and dangerous exploit of the World War—a one-man raid on a German airdrome. Not with bombs and protected by darkness, but with machine guns in broad daylight!

Shortly after sunrise the next morning, he slipped away from 85's airdrome and winged far across the German lines. Coming in at the German 'drome, Bishop saw six Fokkers on the line, props revving. The Hun enemy patrol had not yet taken off. Coming in at an altitude of 300 feet, Bishop dived down through a violent burst of ground machine-gun fire. Thus, he taunted the German pilots to come upstairs and fight, sending Vickers lead pouring into the Fokkers on the line from an altitude of 50 feet.

Banking at the end of the field, he saw a plane skimming, tail up, along the ground in a take-off. Hasty preparations were being made around the other Fokkers. Bishop's challenge had been accepted.

He jockeyed toward the first Fokker. A burst of fifteen. The Fokker crashed on its own field. Another Fokker was already climbing toward Bishop, who did a lightning turn and missed a long shot. His adversary jockeyed and Bishop was out of position for another burst.

By now he was close to the Hun and with full-throttled engine he bolted straight for him. The enemy seeing that they were about to crash, went into a sideslip and cracked up in a cluster of trees bordering the field.

Two more Fokkers took off simultaneously. Bishop sensed a trap as one began to climb above and the other came straight at him. In an instant Bishop whirled, machine guns yammering. So sudden was the attack that the third Fokker went down, shot to ribbons. As the fourth Fokker dived on him, Bishop realized his ammunition was running low. As a final gesture he looped and came down on the Fokker's tail, Vickers flickering red-orange flames. So vicious was the attack that the German pilot showed the white feather by pulling out of the fight. With three more victories to his credit, Bishop flew back to 85's 'drome.

For this daring one-man attack Bishop was awarded the Victoria Cross, promoted to colonel, the youngest in the British military service, and ordered to England to become a staff officer. In a whirlwind finish at the front he shot down twenty-five planes in twelve days. He never was wounded.

And this recalls what might be a coincidence or what might be a physical law. The history of the World War proved that ex-cavalry men made excellent pilots. We have just mentioned Bishop, then come the two Richthofen brothers and several more that deserted their equine mounts for the cockpit of an airplane. Even Count Zeppelin himself was at one time in the cavalry.

Hurdling from a cavalryman's saddle to the cockpit of a Royal Flying Corps' airplane had not been an easy jump. The course Bishop had run was rough going, fraught with "croppers." Yet this Canadian mounted rifleman "ran the course" to win the highest honors ever bestowed upon an airman of the Royal Flying Corps — the Victoria Cross, the Distinguished Service Order, with bar, and the Military Cross.

All three medals were personally presented by King George V to a Canadian ex-cavalryman and super-fighting flying officer—"Billy" Bishop of the Missisauga Horse of Toronto, Canada, then Colonel William A. Bishop, R.F.C., but Billy, the arch-fighting Bishop, to his comrades.

Bishop is the only officer ever to receive these three highest military honors from the king at one and the same time. Coincidently, Bishop is the only fighting pilot to be recognized as the greatest living ace of two great countries—England and Canada.

"Billy" Bishop, cavalryman and mightiest living ace of the R.F.C., was the first Allied pilot to shoot down one hundred enemy planes. His official confirmed victories total 72, although 110 victories would be more nearly correct.

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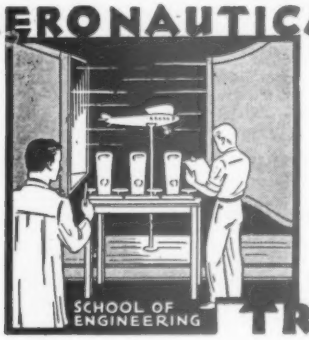

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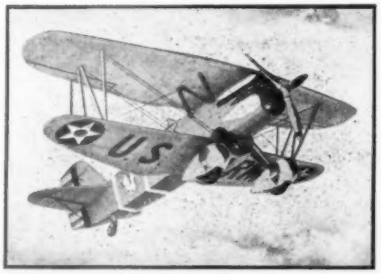

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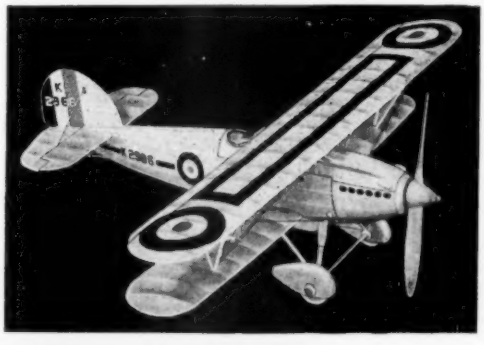

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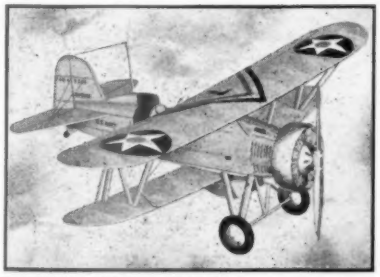

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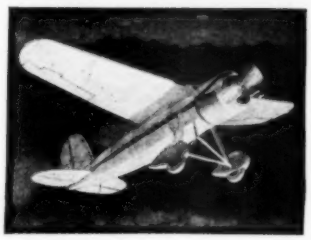

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The September Issue Is an Outstanding Issue

POPULAR AVIATION for September carries many interesting articles and articles that are not only interesting but valuable to aviation enthusiasts. It reaches out into every branch of aviation, covering not only airplanes and engines themselves but the new instruments now being used, navigation aids, airways operation and a host of other phases of aviation that are almost daily advancing aviation.

First and foremost among the articles is a detailed description of a new radio plane locating device that will be a tremendous aid to safe airway flying. It is as much an advance over old beam flying as the new beacons are to a kerosene lamp. Then there will be an article on the new Fairchild Clipper, featured in colors on the front cover. There will be another excellent war story and still more pictures of wartime planes.

There will be notes on lightplane design and construction, more military plane dope by T-2003 and a host of other articles too long to mention here. But—to insure that you will get your September copy of P. A., it is safest to send in your subscription on the handy coupon below.

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Fire-Proofing

(*Continued on page* 104)

After the War there was a great need for an inexpensive quick drying coating material for many purposes, including automobile bodies. Cellulose nitrate was developed for these purposes and the volume of production made it much more available and inexpensive for the covering of airplanes than the safer cellulose nitrate.

The motion-picture and X-ray industries have depended on the cellulose nitrate for the manufacture of film, and the many serious fires that have been caused by the flammability of the film have prompted extensive research to produce cellulose acetate for use in film production. Therefore, cellulose acetate dopes are now only moderately more expensive than cellulose nitrate dopes.

Dr. Kline states that, "When it is considered that the cost of the dope is much less than 1 percent. of the total cost of an airplane, this difference in price of the two dopes becomes insignificant as compared with the potential loss resulting from the destruction of the airplane by the accidental ignition of the fabric doped with the very flammable cellulose nitrate."

The answer then has been found, to rid us in some measure of that demon fire, hovering over and impeding the progress of aviation. No longer will we have to stand by helplessly as the flames envelop a disabled plane and the trapped victims are cremated before our eyes.

The new fire-proof coating for airplanes will be a great safety measure for such gigantic airplane carriers as the "Lexington" and the "Saratoga." When these floating airports are carrying a great number of planes there is always the danger of one plane catching fire through some accident, in which case it is possible for the entire shipload of planes, with their present inflammable covering, to explode and burst into flame.

The development of this nonflammable doped fabric is a tremendous step in the progress of aviation, and the day will come when the average citizen, appreciating the speed and efficiency of airplane travel, will not hesitate to make a journey by plane because he knows his safety is assured.

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The Flea

(*Continued from page* 106)

of Mignet's, is designing and building a four-cylinder, water-cooled upright unit much like a small car engine, with direct drive, 30 h.p., and an expected weight. The price will run around 50 pounds sterling. One of the French Pous is reported to be using a two-cylinder Indian motor. The Pou's design calls for an engine of about 80 pounds.

Most of the Flying Fleas now in construction, or being flown, have been built from the specifications, drawings and directions given by Mignet in his book, *Air Sport*, "Why and How I Have Constructed the Flying Flea" (*Le Sport de l'Air*).

The popularity of the book has been such that the 6,000 issues, published November 2, 1934, are almost exhausted. Four months after it appeared, *Les Ailes*, French aviation weekly, carried a page of illustrations of seven Fleas in construction or in flight. One of them is being towed along a road to an airport, its wings turned lengthwise over the fuselage, out of the way of traffic.

Groups of amateurs all over France are forming Pou clubs, to help each other in construction. Among the organizations which have built Pous are the Aero-Club of Paris and the Gad'z' Arts School of Angers. The idea is rapidly spreading from France to neighboring countries to such an extent that one Flea is reported being built in Spain, two in Roumania, 20 in Belgium and a number in Switzerland.

So much interest has been aroused in England, where a writer in the *Handley Page Bulletin* has termed the Flea "one of the most interesting aeronautical conceptions of recent years," that the Air League of the British Empire has formed a section called the Pou Club. Air Commodore J. A. Chamier of the league, president of the Pou Club, states that the efforts of the club will be bent toward giving mutual aid in obtaining materials and in construction, and taking up on its members' behalf, such questions with the Air Ministry as condition for certificates of air worthiness, and permits to fly.

It is desired that the ministry shall set up a minor certificate of airworthiness which enable the Pous to be used in cross-country flights and to send out traveling government inspectors to inspect materials. Pending aerodynamic tests of the plane, the Air League does not guarantee its airworthiness, but Commodore Chamier feels that the evidence is that Mignet has based his plans on substantially sound theoretical considerations, and has gone far toward substantiating his claims in the 180 take-offs and landings he has made, in his cross-country flights, and in his 60 hours in the air with the Pou in varying weathers.

The appearance of a new light-powered plane called the "Drone," and manufactured by the B.A.C., Ltd., firm in England, may increase the pressure on the Air Ministry to such an extent that some sort of intermediate license will be established, of which the Pou flyers may take advantage.

The Drone, powered by a 16 hp. motorcycle engine, is claimed to have a cruising speed of 50 m.p.h., to average 50 miles a gallon, to be flyable with little instruction, to take off in 100 yards and to land with a dead engine at less than 25 m.p.h. Its cost, however, $1,375, puts it out of the class of the Flying Flea, which is intended to make air flight available to the large unmonied class.

Disinterested performance data is not yet available on the Flying Flea. However, Mignet reports that it takes off in 300 yards, climbs 50 feet within 250 yards from the take-off, reaches an altitude of 1,600 feet in six minutes and 3,000 feet in 18 minutes; lands with a dead stick at 18 m.p.h., and uses about two gallons of gas and oil in an hour's flight of 60 miles. Mignet built his Pou in 27 days, working 10 hours a day.

Of the 12 Pous built by French amateurs before the end of March, ten flew on the first trial. The other two cracked up without injury to the pilot, not from faults in handling but from errors in construction, according to Mignet's investigation. In one of them, a Clerget 16 h.p. engine, weighing about 55 pounds was used in place of the heavier motor employed by Mignet. The lack of weight and of power for which the plane was designed sent it into a spin. In the other accident the wing got out of control.

The question which naturally arises in American minds is the ability of the light low-powered Pou to hold its own in bad weather. This question is partially answered by the demonstration put on by Mignet at the aerodrome of Arly on December 13, 1934. In rains varying from gentle to torrential, and in wind officially reported as varying from 20 m.p.h. to gusts at 40 m.p.h. Mignet gave a 15 minute demonstration in which he climbed, made turns and dives, flew up wind and down, hedgehopped, landed with short runs, and landed with dead stick.

END.

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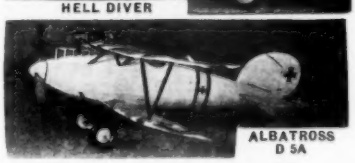

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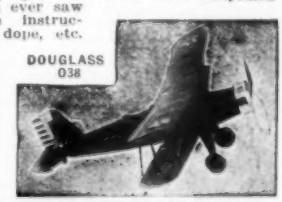

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T-2003

(*Continued from page 78*)

The first trip together he shot his own rudder-post so full of holes that the rudder almost dropped off on their return to the airdrome. The next raid, he got miserably airsick and lost all his Lewis machine gun magazine pans over the side, together with other things. On their return, as he drifted over the trees bordering the field, the pilot was so un-nerved by it all that he slammed into a team of horses, engaged in ploughing the fields adjacent to the airdrome.

"According to the mess attendant, the pilot and sandbag both emerged unhurt from the wreckage. The messman had left off serving me breakfast to watch the flight's return as he was professionally interested in how many late breakfasts he must serve, or ahem, how many places he *needn't* set at all. Some of the squadron wondered why the little sandbag came into the Mess with a wrecked nose. Perhaps the fact that his new pilot had the Flight Surgeon plaster up a broken knuckle had something to do with it? What?"

"THEN I," spake the Ol' Timer, the next day as he read the manuscript of the foregoing diatribe over my shoulder, "was a sandbag, was I? Hah."

He laughed shortly and spat reflectively into the hot dust alongside the Operations Office where we were seated.

"Lemme tell you my, or rather our, side of the story," he continued. I did, gladly, that's why I had let him read the pilot's case, and here's what *he* had to say:—

"Sandbags, is it? That from an 'Aerial Chauffeur,' as we called the control workers of a decade-and-a-half ago. I was an observer, but not, thankawd, in the same outfit with the lad who gave you that sort of hooey. We observers at the Front used to tell a good one. It seemed there were a pilot and his observer just returned from a mission over the lines, which mission had been rankly unsuccessful. Both felt in an accusatory mood. What, demanded the pilot sarcastically, could be dumber than a dumb observer? A smart pilot, replied Half-Wings truthfully. And the fight was on.

"However, most such differences were more for the sake of argument, and as one doesn't argue with someone he despises, feelings could never have been so strained as we like to tell. As I said, I wasn't that pilot's rear-seat man; I was in observation, but I know the lad he refers to as 'The Dope.' Sure he looked like a kid, his face was innocent of the deep lines of dissipation and careless living that—but we'll let that pass.

"*I* shot my own tailgroup full of holes, twice. Once was when our own pursuit failed to rendezvous as we crossed the lines and five Pfalz jumped us, just one poor DeH. The leader slid right in on our tail. I slapped a few into his spars but it didn't do any good.

"To keep from overrunning us he had to pull up his nose a bit and as he shot, the bullets passed overhead, I could see the tracers. All this in a period of five seconds or so. My pilot was flying straight (home) and fast, ready to pot anyone with his forward guns if they gave him the chance, so he afterward claimed, but I noticed a bit later on that his neck was pulled way in and he was peering down at his feet most of the time (or bowing his head in prayer).

Anyway, this E. A. came at us, who had the slower ship, just a little too fast, and swerved aside slightly to keep his prop off our tail and to get set for a round of shots right at me and the pilot. I saw his head and shoulder right back of my rudder. All the stuff I had learned at the gunnery school at Cazeau about gunsights was forgotten.

"I let him have it, right off the hip you might say. Through my own rudder and all. T'hell with it. He limped away and headed for his lines. The others followed him. He must have been a Big Shot, detailed as Flight Leader and acting in that capacity with four *good* flyers to ride herd on him, and see that he got his victims without any harm coming to him in turn.

"That time we got back to the airdrome and when my pilot gave her a kick to taxi downwind, darned if the top of the rudder didn't come loose. Unless he reads this and remembers the circumstances, my pilot will go through life believing that it was the bullets of the EA instead of my own that had eaten his rudder post away.

"On another flight but with another pilot on his first trip, but on my tenth, over the lines, the pilot was surprised to feel a tug on his sleeve and imagine his astonishment when the oil gauge immediately smashed up. Indeed you can imagine his embarrassment when he looked behind and saw that I was nowhere in the cockpit. A bullet from nowhere and I was gone from the plane. Did they shoot the observers right out of their cockpits, thinks he?

"What *I* was doing was crouching down in the cockpit, operating my tunnel gun against a gent of the opposite persuasion who was trying to ream us from below and behind with his gun. He ran out of ammunition about the same time I did. 'Twas a hot day, and the air was terrifically bumpy, which made it almost impossible to hold a sight on a target. Several times the lad with the Pfalz flew right alongside us while I thumbed my nose at him and reviled him with angry gesture. He must have known my tunnel gun was empty.

"What he *didn't* know was that my other rear guns each had on a full pan, and were all cocked, just rarin' to go. As a last parting wave he swung around and flew across our rear, trying to clip our tailgroup with his wheels. I could see him coming at us and figured he would go for our tail. It was a trick I'd heard about from one of the French pilots. The guns were in their clip on top of the turtleback cowling. As he sailed past, all I did was lean over and pull the triggers. Right through our tail, but through him too. As we flew on our way we could see him side-slip down and down until he hit the ground.

"And then my Aerial Chauffeur looked around and saw me, back in the ship. He looked back at our late adversary slipping to earth, then back at me. Even coming into a landing he looked back at me. He knew I was

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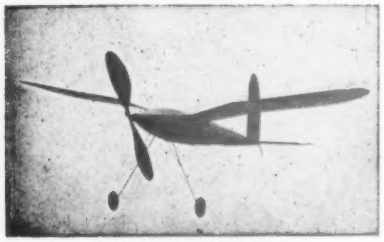
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flesh and blood and no ghost, for after disposing of the Pretzel Bender I had written my helpless pilot a note telling him to kink the oil tube leading to the pressure gauge before he lost all the oil from the Liberty that was spraying into his face. We almost cracked up in a soft spot on the airdrome, he was so engrossed in looking me over. He got sore at my laughter over his oil blackened face.

"And then we both blamed each other for coming back home with our mission entirely forgotten!

END.

Aero-Sportswoman

(*Continued from page* 94)

home of Martha Smith for a farewell tea party before leaving for their homes. Once more Dayton has lived up to its reputation as a gracious host.

Earlier this spring the Chicago unit of the W. N. A. A. elected Mrs. Schuyler B. Terry president of the local chapter. Mrs. Terry, herself a flyer, is also a member and national director of the N. A. A. Her sincere enthusiasm and broad knowledge of the whole field of aviation is an invaluable asset to both organizations and the fact that she holds important positions in both associations will insure a close cooperation between them.

END.

Aero Directory

(*Continued from page* 102)

Solar Aircraft Co., Ltd., Lindbergh Field, San Diego, Calif. Exhaust collectors, manifolds, etc.

DOPE—VARNISH—PAINT

(See Accessory and Supply Dealers)

Berry Brothers, Detroit, Mich., and Walkerville, Ont. Berryloid, varnish.

Dibble Color Co., 1499 E. Grand Blvd., Detroit, Mich. Aircraft finishes, Dope, Enamel and primer.

Glidden (The) Company, Cleveland, Ohio. Fabricote, Dope, Enamel, primers, varnish, paint and all finishes for aircraft.

Ort, Karl, 608-640 W. Poplar St., York, Pa. (Retail dealer.)

Phenix Aircraft Products Co., Williamsville, N. Y. Phenix Nitrate Dope.

Titanine, Inc., Union, N. J. Titanine Dope.

ENGINES & MOTORS

The A. C. E. Corporation, Marysville, Mich. Cirrus and Hi-Drive engines.

Burnelli Aircraft, Ltd., Motor Division, Keyport, N. J. Makers of the Aeromarine engines. (Formerly Aeromarine Plane & Motor Co.)

Aeronautical Corporation of America, Cincinnati, Ohio. Makers of the Aeronca lightplane motor.

Aircraft Holding Corporation, Box 182, Culver City, Calif.

Allison Engineering Co., Speedway, Indianapolis, Ind.

Aviation Diesel Engine Co., (Ltd.), 548 Roosevelt Bldg., Los Angeles, Calif.

Aviation Holding Co., Holland, Mich. The Szekely engines.

Bliss Company, E. W., 53rd St. & Second Ave., Brooklyn, N. Y. Builders of the American Siemens-Halske radial engine.

Continental Aircraft Engine Co., 12001 E. Jefferson Ave., Detroit, Mich. Makers of the Continental engines.

Corben Sportplane Co., Madison Airport, Madison, Wis. Ford conversions.

General Airmotors Corporation, Scranton, Pa.

Guiberson Diesel Engine Co., 1000 Forest Ave., Dallas, Texas. Makers of the Guiberson Aircraft Diesel Engine.

Hurricane Motors, Inc., 1931 Antoinette, Detroit, Mich.

International Aircraft Corporation, Niles, Mich. Makers of the Heath lightplane engine.

Jacobs Aircraft Engine Company, Central Airport, Pottstown, Pa. Makers of the Jacobs engine.

Kinner Airplane & Motor Corporation, Ltd., 635 W. Colorado Blvd., Glendale, Calif. Makers of the Kinner engine.

Lambert Aircraft Engine & Machine Corp., Lambert Field, Robertson, Mo. Makers of the Lambert engine.

Le Blond (The) Aircraft Engine Corporation, Cincinnati, Ohio. Makers of the Le Blond engine.

Long, Lester, Cornelius, Ore. The Harlequin lightplane engine.

Lycoming Manufacturing Company, 652 Oliver St., Williamsport, Pa. Makers of the Lycoming Engine.

MacClatchie Manufacturing Company, P. O. Box 189, Compton, Calif.

(*Continued in next issue*)

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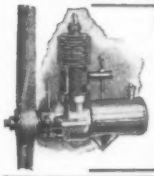

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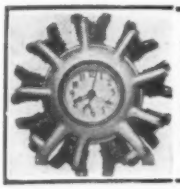

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MISCELLANEOUS

HELMETS, goggles, instruments, souvenirs for clubs, etc., turnbuckles and shackles. Trade for instruments or what have you?—Anderson, 106 Cook, Ithaca, N. Y.

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WANTED—Pair of 7:00x4 air balloon tires or pair of 16x7-3 air-wheels with hubs for 1¼" axle. Also want April 1934 Aero Digest.

HAVE—New Szekely SR3-L prop. Aeronca motor parts and prop.—A. C. Fowler, Hurricane, W. Va.

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ENGINE WANTED. A small lightplane engine of any make or type, between 25 and 50 horsepower. Must be in good operating order and complete with all of the necessary accessories.—G. B. HAL, Wilmette, Ill.

XUM

de Seversky

(*Continued from page* 116)

government, realizing one of his fondest dreams. That of mingling with American citizens. He recalls with a grin how he was once disciplined for shaving in imitation of the beardless faces of his American cousins. His next step, now that he was a guest of Uncle Sam, was to become a member of his household as a citizen.

This accomplished, he organized the Seversky Aero Corporation and took over the posts of president and general manager. He gave Igor Sikorski his first job in this country and backed that brilliant Russian until he could spread his own wings here. De Seversky considers his commission in the Air Corps Specialist Reserve one of the greatest honors he has ever obtained. This statement coming from him is not made for publicity purposes but springs from his deep-seated admiration for his adopted country and his fellow citizens. That they have honored him with a high rank in their military service is a fact he keenly relishes.

In 1931 he organized the Seversky Aircraft Corporation to build all-metal amphibians. Personally, he vastly prefers to fly amphibs although he organized his business because he understood the need for better aircraft in this field.

Major de Seversky is at present a consulting engineer for the Army Air Corps. He is also called in by various automobile manufacturers in connection with some of his inventions which have found a wide market in the automotive field. He married an American girl who is able to cook food he likes but whose accomplishments as an aviatrix likewise make her something of a phenomenon among her ultra-modern countrywomen.

She likes to cut capers in the air although she doesn't go in so much for protracted upside-down flying which is the Major's favorite stunt when he's upstairs and has a clear sky. Her first passenger after she learned to fly was none other than Major Jimmy Doolittle.

De Seversky is regular in any crowd and much in demand on gatherings of the flying crowd, both army and civilian. He has a slow smile, can keep up with anyone in telling stories and quaffs off a cup now and then if the occasion demands it. And has named his pet dog "Vodka." Like Roscoe Turner's lion, "Gilmore," "Vodka" gets in quite a few flying hours.

The Major spends a lot of time at Wright Field where the vast army experimental laboratories are maintained.

Among the inventions which have found wide acceptance in this country are his numerous bombsighting devices, an illumination system for airports, an automatic drift control device, hydraulic shock absorbers, an automatic anchoring attachment for seaplanes, amphibian and other type landing gear, skiis, such as he fitted on Sir Hubert Wilkins' polar exploration plane.

END.

Stratosphere

(*Continued from page* 100)

tant to learn how much ozone exists in the upper atmosphere, and just where it is.

Sky, Sun and Earth Brightness. The sky becomes progressively darker as one rises from the earth. Thirty or forty miles above sea-level it is probably almost black. At such altitudes it is likely that an observer (if it were possible for him to be lifted so high) would see the stars shining much as they do in a night sky.

The sun, on the other hand, becomes brighter at higher altitudes, since at those levels the gases which its rays have penetrated are much less dense than those closer to the earth. Earth brightness, or the power of the earth to reflect sunlight, is known to astronomers as its "albedo." It is generally accepted to be about six times that of the moon. It is desirable, however, to check the earth's albedo under conditions existing at the time of the flight.

Wind Direction and Velocity Studies. Some surprising facts in regard to wind direction were brought out by the 1934 flight of *Explorer I.* Above an altitude of 60,000 feet, the wind was found to be moving between six and ten miles an hour from east to west. All winds encountered at lower levels were moving in general toward the southeast and at much greater speeds.

At an altitude of 42,000 feet the maximum wind velocity of 70 miles an hour was found. It is not known whether the slow wind to the westward encountered near the "ceiling" of the 1934 flight was in the nature of an eddy or whether it represented the lower portion of a major drift of air to the westward.

Checks on Measurements of Altitude Made by Barometers. Last year, comparisons were made by means of photographs taken vertically downward from the gondola with a camera whose focal length had been determined accurately. It was found from these angular measurements that the balloon reached altitudes higher than those indicated by the international barometric formula which makes use of average annual air densities. The photographic determinations corresponded rather closely, however, with the barometric determinations made by the Bureau of Standards in which actual densities and temperatures of the air at the time of the flight were taken into consideration.

During the 1935 flight, barometer and camera again will be used to determine altitude. In addition engineering parties on the ground, provided with transits, will make observations of the balloon at predetermined times.

Balloon Navigation Problems. Special consideration will be given to the behavior of helium in a large free balloon and to the acquisition of superheat. The latter is heat acquired by the gas in the balloon bag from the sun's rays, in excess of the heat of the surrounding air. This superheat causes extra expansion of the gas and so increases its lifting power. Superheat is lost as the sun declines in the sky or when the balloon passes under clouds.

Changes in Electrical Conductivity of the Air. Dry air near sea level is a very poor conductor of electricity. When the gases of the air become ionized—that is, when air atoms lose some of their electrons, thus becoming charged—the electrical conductivity of the air increases. The marked increases in conductivity at high altitudes is due to a high degree of ionization at those levels.

Studies of Radio Signals. In addition to the principal radio instruments which will transmit and receive voice signals, the gondola will carry two ultra-high frequency transmitting sets which will be kept in continual operation, sending out modulated waves. These ultra-high frequency waves are believed to behave somewhat like light waves.

If they behave exactly like light waves they can be received only within the horizon theoretically visible from the gondola.

Spore Studies. In one project, a sterile tube will be dropped from the highest altitude attained by the balloon through six or seven miles of stratosphere air in an effort to determine whether living spores float in the stratosphere. Some spores that float at lower levels of the atmosphere, are known to carry diseases of crops and plants, while others are harmless. In a second project, spores of various kinds will be exposed in quartz tubes to see if they will survive the streams of rays which pour upon them in the highest region reached.

Effects of Stratosphere on Fruit Flies. Cultures of fruit flies (Drosophila) will be taken aloft to determine whether their bombardment by the radiations encountered at extremely high altitudes will affect the characteristics of their descendants.

Recording Barographs. Two recording barographs, calibrated under the supervision of the National Aeronautical Association and the Fédération Aéronautique Internationale, will be taken aloft to record the official altitude obtained during the flight.

Oblique Photography. Photographs will be made from a special aerial camera, the filter and lens of which will be mounted directly in the shell of the gondola, at an angle of eight degrees below the horizon. The camera will use film especially sensitive to red rays of light, and will be equipped with a filter of solid red glass. It is believed that photographs taken with this equipment will penetrate the haze near the horizon, and will show the curvature of the earth.

Motion Pictures. An Eyemo motion picture camera will be carried in the gondola. With it photographic studies will be made through glass-covered portholes of the receding earth and the expansion and unfolding of the balloon.

END.

Lightning

(*Continued from page* 84)

a continuous metallic member which has relatively short longitudinal radius of curvature."

While the committee found some basis for belief that high-frequency disturbances could penetrate to the region within the outer envelope of the airship, general doubt was expressed that such penetration was likely to attain alarming proportions. No direct evidence was available since grave internal troubles of this character have not included themselves in the repertoire of past flying experience. However, consensus of opinion ruled that if electrical phenomena arising outside the airship could become sufficiently serious for observance inside, some manifestation of them and their destructive nature would have occurred in previous aviation history.

At any rate, protection against such possible high-frequency phenomena is relatively simple and easily attained by a close approach to the principle of the Faraday cage. Apparent safety measures include providing electrical conductivity to the surface of the outer envelope through the incorporation of conducting ingredients or by the use of conducting paints; reducing the spacing of metallic members and of wire bracing; and protection of gas bags by wire mesh or other conducting screens. In view of the facts presented and the protective measures obtainable, the committee did not regard the subject as being of adequate importance to justify recommendation for further experimental study.

The same rules for elimination of trailing radio antenna during thunderstorms apply to control of an airship as well as an airplane. The antenna should be withdrawn in stormy weather, and if operated under such conditions, it is possible to limit any resulting damage to the antenna itself or to the radio equipment connected therewith.

A question arose regarding the danger involved in suspending an observer from an airship. Since a cable much longer and larger than the usual antenna is required, the action in facilitating a lightning discharge would be correspondingly increased. Aside from this fact, however, and its possible effect on the airship itself, it was agreed that if the observer is housed in a metallic cage, no great additional hazard is probable for him. Danger of rupture of the cable through fusion by electric arc was considered extremely unlikely.

Although the committee refuted the theory that lightning constituted a hazard to aircraft of proper construction, other dangers associated with thunderstorms were emphasized as offering real concern to aviation interests. Among the more pronounced perils are violent and turbulent winds which form an undeniable source of destruction and acute danger. Airplanes and airships alike should avoid storm areas and their accompanying winds, if loss of life and property are to be prevented.

The special committee on hazards to aircraft due to electrical phenomena which is responsible for the conclusions as stated, was established in response to a request of Rear Admiral Ernest J. King, U. S. N., Chief of the Bureau of Aeronautics of the Navy Department. This committee, appointed by the National Advisory Committee for Aeronautics, was composed of the following members: Dr. Charles F. Marvin, Weather Bureau, Chairman; Dr. L. J. Briggs, Bureau of Standards; Commander Garland Fulton (C. C.), U. S. N.; Dr. W. J. Humphreys, Weather Bureau; Dr. J. C. Hunsaker, Massachusetts Institute of Technology; Mr. G. W. Lewis, National Advisory Committee for Aeronautics (ex officio); Dr. F. B. Silsbee, Bureau of Standards, and Professor John B. Whitehead, Johns Hopkins University.

The report was first drafted, on the basis of a general discussion of the problem at a meeting of the special committee held on December 21, 1933, by a subcommittee consisting of Professor Whitehead, chairman, and Doctor Silsbee, assisted by Dr. M. F. Peters of the Bureau of Standards.

END.

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